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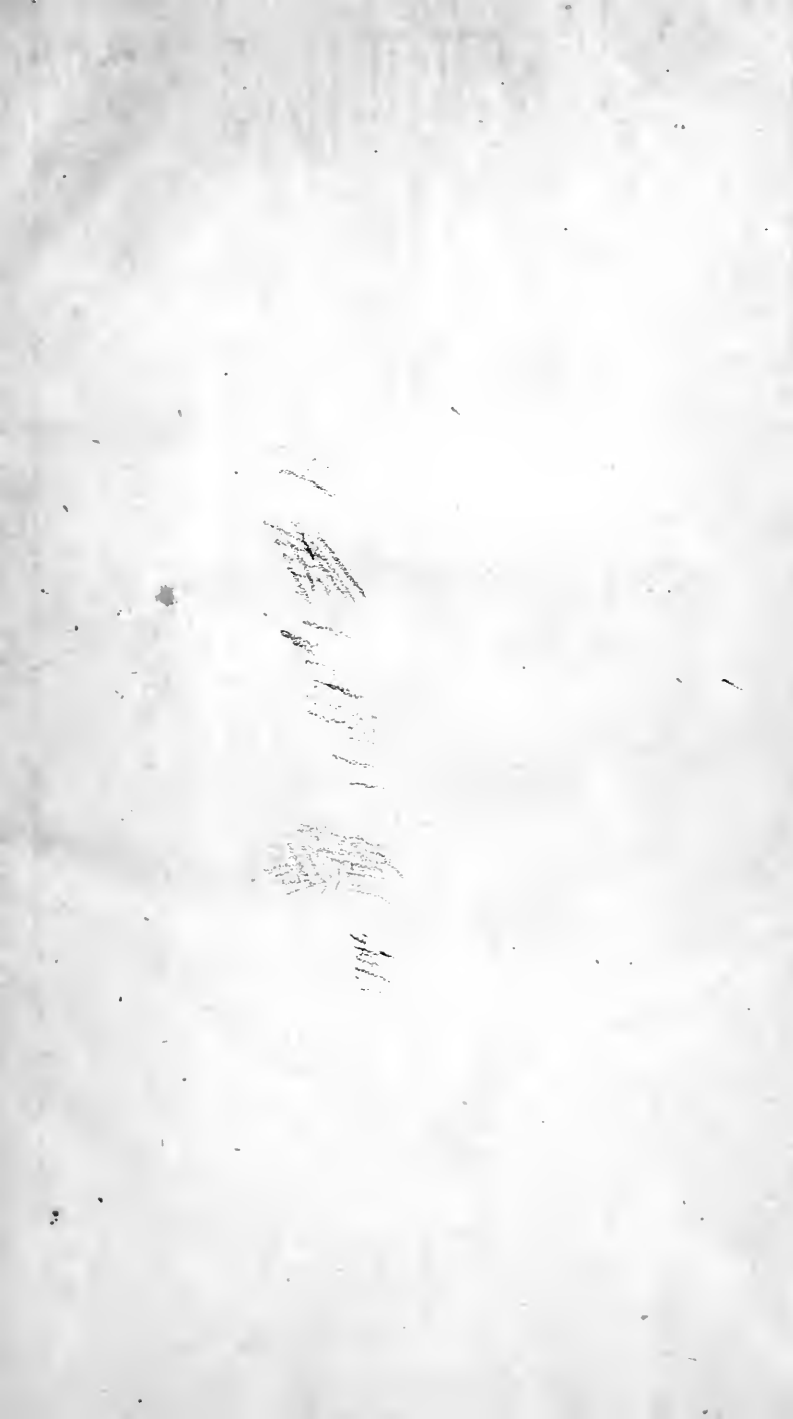
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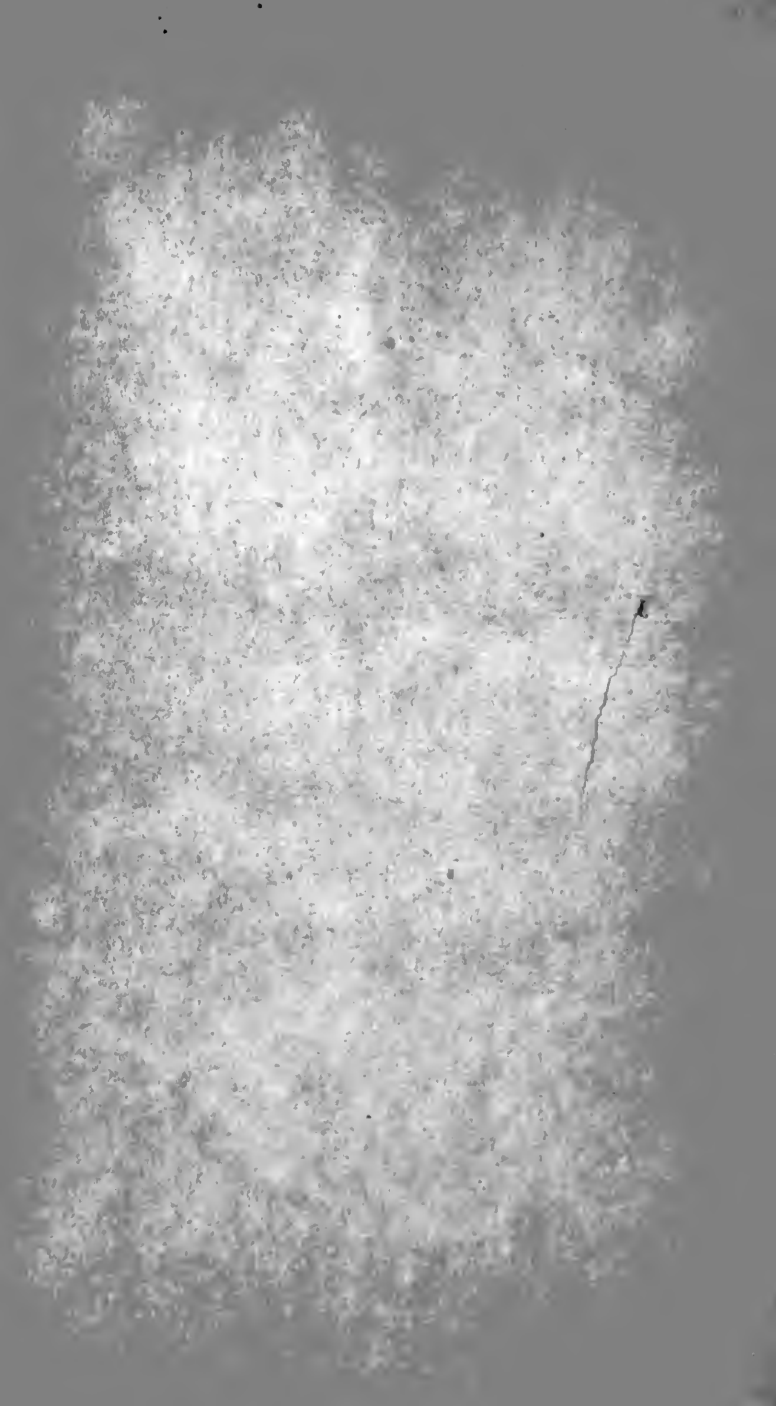
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*The Egyptian Papyrus, or Paper-Rush.
Taken from Prosper. Vignus*

HISTORICAL ACCOUNT

OF THE

SUBSTANCES

WHICH HAVE BEEN USED TO

DESCRIBE EVENTS, AND TO CONVEY IDEAS,

FROM THE

EARLIEST DATE

TO THE

INVENTION OF PAPER.

SECOND EDITION.

PRINTED ON PAPER MANUFACTURED SOLELY FROM STRAW.

By MATTHIAS KOOPS, Esq.

LONDON:

PRINTED BY JACQUES AND CO. LOMBARD STREET, FLEET STREET.

1801.

TO
HIS MOST EXCELLENT MAJESTY
GEORGE THE THIRD,
KING
OF
THE UNITED KINGDOMS
OF
GREAT-BRITAIN
AND
IRELAND.

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY OF ARTS

AND ARCHITECTURE

OFFICE OF THE DEAN

540 EAST 58TH STREET

CHICAGO, ILLINOIS 60637

TEL: 773-936-5000

MOST GRACIOUS SOVEREIGN.

SIRE,

YOUR MAJESTY having been Most Graciously pleased to grant me Patents for extracting printing and writing ink from waste Paper, by reducing it to a pulp, and converting it into *white Paper*, fit for writing, printing, and for other purposes; and also for manufacturing Paper from Straw, Hay, Thistles, waste and refuse of Hemp and Flax, and different kinds of Wood and Bark, fit for printing, and almost all other purposes for which Paper is used,

And

And YOUR MAJESTY having in September last year condescended to permit me to lay at Your feet the first useful Paper which has ever been made from Straw alone* without any addition of rags; the Gracious Reception it has met with from YOUR MAJESTY, the approbation of the Publick, and the encouragement which the Legislature has given me by passing an Act of Parliament in its favour has engaged me to reprint these lines on Paper manufactured from Straw solely in a more improved state, although not yet brought to such a state of perfection as it will be made in a regular manufacture, which must be entirely

* Part of this Edition is printed on Straw Paper.

constructed

constructed for such purpose, and which I most humbly flatter myself will now much sooner be established by the indulgence which YOUR MAJESTY'S Parliament has granted me. This new Essay proves, there cannot be any doubt that good and useful Paper can be made from Straw alone.

The favourable manner in which YOUR MAJESTY has deigned to look on these my humble attempts of discovery shall be a constant incitement to future exertions, and the prospect of meriting commendation of a KING, always ready to countenance the most humble endeavours which tend to the common welfare, and who has proved
Himself

Himself the Illustrious Patron and Protector of Arts and Sciences, obliges me to unremitted perseverance to bring my attempts to perfection, in the prospect of meriting YOUR MAJESTY'S commendation, which will be the greatest pleasure I can be sensible of.

With the most ardent wishes for YOUR MAJESTY'S health and longevity, and with all possible deference and humility, I beg leave, MOST GRACIOUS SOVEREIGN, to subscribe myself,

YOUR MAJESTY'S

most devoted,

most obedient,

and most humble Servant,

17, James-street,
Buckingham-gate,
August 30, 1801.

MATTHIAS KOOPS.



THE art of Paper-making ought to be regarded as one of the most useful which has ever been invented in any age or country ; for it is manifest, that every other discovery must have continued useless to society if it could not have been disseminated by manuscripts, or by printing.

Scientific men, who were neither artists nor manufacturers, have, by means of this invention, been enabled to communicate their projects, which mechanics have afterwards improved and perfected, and by this means enriched the commonwealth.

Without the use of Paper, geography and navigation must have been very incorrectly understood; the beautiful charts of the ocean so accurately laid down have established our commercial intercourse with every part of the globe with safety; at the same time that the delineations upon maps of places, rivers, and countries, are now so correct, that they enable a traveller to proceed without danger, and even predict, with certainty, the time it will require to convey him to any part of the globe.

It may be asserted, indeed, of this country, that its grandeur and commercial dignity have been greatly exalted by the invention of Paper; for it is presumed, that the superiority which distinguishes the manufactures of this Island, chiefly depends upon the liberal publications concentrated from all the rest of the world, which have so greatly increased in latter years, and which are likely
farther

farther to be augmented. It is, in short, the reputation of the goods fabricated in Great-Britain, which has elevated it to the splendour and fame it now possesses, in the scale of nations, and enables it to monopolize the trade of the universe.—All these are benefits which have flowed from the invention of Paper; and which have so largely contributed to the present flourishing state of the country.

What infinite trouble and labour, what a fruitless consumption of time has not been saved by the knowledge of Paper! how many laborious and dangerous experiments have not philosophical projectors been spared! what labour of investigation and study have not been abridged by the events which the experiments of others have handed down to posterity! thereby affording to the present age a body of information more than adequate to the knowledge any one man could

have attained to in a thousand years, with all his faculties.

This reflection alone must fix such an impression on any thinking mind of the invaluable utility of Paper, as to render any further commendation unnecessary; but in short, the inventions of Paper and Printing have been the causes of the various gradations of improvement in every art and science. Without it, the present age would neither have been more civilized nor wiser than it was many centuries ago, because one age could never have conveyed to its posterity what the labours of the past had achieved; for it is well known that, in dark and barbarous ages, the inhabitants of no country have ever made any progress towards improvement and civilization without the use of Writing, Printing, and Paper; and it seems very probable, that the early knowledge of this article amongst the Chinese has been the cause of those acquire-

acquirements which have distinguished that truly wonderful nation: for it may be affirmed, that in proportion to the quantity of Paper consumed, by any stated number of inhabitants in literary pursuits, so will be their comparative information, civilized state, and improvement.

To enumerate all the various advantages which the invention of Paper has afforded mankind, could not be contained in an Essay of this nature: its uses are unquestionable; and the important services it has yielded to all countries where it has been employed are not to be calculated; it is sufficient to say here, that the growing youth are educated with facility in the principles of their duty, and barbarous states have been softened and enlightened by means of this discovery.

Although this subject might be much enlarged upon, the intention of this Ad-

dress is most humbly to present to *Your Most Gracious Majesty* the *first* useful Paper manufactured *solely* from *Straw*, and on which these lines are printed,

From the remarks which have been already made, every person must be convinced, that it is of the utmost consequence to prevent the scarcity of the materials from which Paper is to be fabricated. Although cotton has been likewise used for this purpose, paper-makers in this country have depended on linen Rags for the regular pursuit of their employment.

All Europe has of late years experienced an extraordinary scarcity of this article, but no country has been so much injured by it as England. The greatly advanced price, and the absolute scarcity, equally operating to obstruct many printing-presses in this kingdom; and various works remain, for these reasons, unpublished, which
might

might have proved very serviceable to the community.

The great demands for Paper in this country have rendered it necessary to be supplied from the continent with Rags. This supply is extremely precarious, and is likely to be more wanted as the consumption of Paper increases, because this material, which is the basis of Paper, is not to be obtained in England in sufficient quantity. The evil consequence of not having a due supply of Rags has been the stoppage of a number of Paper-mills; and as it is a manufactory which requires numerous hands (of men, women, and children); a great number of them have been thrown upon their respective parishes for want of employment. A still more important consideration, in the view of commerce, presents itself, when the raw material comes from abroad, because the importation of it is paid in hard cash,

the preparation of which might have employed numbers of idle hands at home advantageously.

These reflections induced me to make various experiments, with a view to remedy, in some degree, this evil; and, after many trials, I have the satisfaction to remark, that I have discovered several substitutes for linen Rags, which have been heretofore untried and unknown, and which will merit the attention of the public. One of these discoveries is the Art of extracting Printing and Writing Ink from Waste Paper, whether in small or large pieces, by obliterating the ink, and rendering the Paper perfectly white, *without injuring the texture* of the regenerated Paper, and of a quality as good as it originally was, for the purposes of writing and re-printing.

It is worthy of the directors of families to order their servants to save all the waste

White

White Paper, such as letters and old writing-paper, which are generally thrown away or burnt, and regarded as of no consequence; for, should this be attended to, very considerable quantities would be collected, and large sums of money saved, which are now expended in foreign countries for Rags; because, if we calculate that Great Britain contains fifteen hundred thousand families, and that half a sheet of Paper should be daily saved in every family, it would produce four thousand four hundred tons,* which is about one-third of the quantity of Rags which have, of late, been converted annually into Paper in this country; whereby near two hundred thousand pounds would annually remain in this country, which sum is now sent abroad for the purchase of Rags; and eighty-two thousand one hundred and twenty-five pounds would be saved from

* A ream, or five hundred sheets, being calculated at eighteen pounds weight.

fire and destruction, calculating a pound of old Paper torn into pieces at two pence.

It has been imagined, that the present war has principally contributed to produce the scarcity of Paper-stuff, which, however, does not appear to be the sole cause, because the quantity of Rags used for making lint is very inconsiderable, compared to the enormous quantity at present used for the manufacture of Paper. Cartridges have usually been made on the continent of old written Paper, which heretofore has been of no other use to Paper-makers than for the fabrication of paste-boards.—It appears, from various considerations, that the scarcity has originated from the extension of learning, which occasions much larger quantities of Paper for writing and printing; the large increase of newspapers and monthly publications. Additional stationers, printers, and booksellers, countenance this opinion.

opinion. More children are now every where taught to read and write; and the hand-bills of every description, used for shopkeepers, plays, quackery, and other trades, require additional quantities of Paper. Paper-hanging, which is an invention of the middle of the seventeenth century, has, of late years, become more general; and few new-built houses are finished with walls, or wainscot, as formerly, but the surface is every where decorated with painted or stained Paper, which is the most beautiful, the cleanest, and the cheapest ornament for furnishing rooms.

I beg leave to observe, that little general knowledge, upon this useful subject, has been hitherto communicated to the public; I, therefore, will endeavour to give a brief historical account of the various methods and materials which have been used to convey ideas to posterity, from the most ancient

ancient date to the period when the art of making Paper, from linen rags, was invented.

The art of writing, in itself, proves that mankind, at the time of its invention, must already have been in a certain degree civilized, and cannot therefore be very ancient; but the exact time when this art was discovered is impossible to be traced.

The invention of *letters*, and their various combinations, in the forming of words in any language, has something so ingenious and *wonderful* in it, that most who have treated thereof, can hardly forbear attributing it to a *divine original*, and speaking of it with such a high admiration which is not far from a kind of rapture. Indeed, if we consider of what vast, and even daily *service* it is to mankind, it must be certainly allowed to be one of the *greatest*, and most *surprising*

surprizing discoveries that ever was made in the world. No person can deny of what general use the art of writing is in commerce; in contracts of every kind; in preserving, improving, and propagating learning and knowledge; in communicating our sentiments to, and corresponding with our friends, with those we love, or others, at any distance, whither letters can be conveyed. And by the means of writing, as the most valuable of all its advantages, we have a code of divine laws, useful history, indisputable revelations, as a constant *directory* for our conduct, in our course through this probationary state of life, to a happy eternity.

Notwithstanding these great and manifold benefits, which men have all along received from this curious and wonderful invention, it is very remarkable, that writing, which gives some degree of *immortality*

utility to almost all other things, should be, by the disposal of Divine Providence, so ordered, as to be careless in preserving the memory of its first founders. No archives are preserved, wherein the names of those persons are repositèd, that have deserved so much of mankind, by inventing the *characters*, and *alphabets*, proper to express their own language and thoughts! If we enquire only after our own country way of writing, who can tell us the names of those ingenious men, that first found out the *alphabets* used in our offices of records, or indeed any hand in use amongst us?

Some make objections to this boasted *utility* of writing, and likewise to the new-discovered substitutes for Paper-stuff, by which the quantity of Paper, unavoidably necessary for writing, will be so greatly encreased. They alledge, that
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the *inconveniencies*, and *evils*,* that letters are the causes of, are equal to, if not more, than the *advantages* that arise therefrom. *Vicious* and *libertine* books, say they, are the lasting sources of corruption in *faith* and *morals*. By the means of Paper and writing, false notions in religion, and even highly irritating heresies are broached, and speedily propagated; traitorous correspondencies are held, and deceitful contrivances are carried on to the ruin of private families, and often to the destruction of happiness in wedlock; and sometimes to the subversion of public administrations and government, which we

* *N. Tate*, Poet Laureat in Queen *Anne's* time, wrote the following lines on the *good* and *evil* of writing.

View writing's art, that like a sovereign Queen
Amongst her subjects sciences are seen;
As she in dignity the rest transcends,
So far her power of good and harm extends;
And strange effects in both from her we find,
The *Pallas* and *Pandora* of mankind.

have

have in late years experienced in the major part of Europe.—It is certain that much mischief has arisen from Paper and Writing; and yet what is it but saying, that the pen is as dangerous an instrument in the world as the tongue? must we therefore renounce the use of the one, as well as the other? This would be a fanatical extreme, that all persons of common sense and common prudence will avoid and abhor: for it is evident, that it is not the proper use, but the abuse of the art, that is objected against.

Lycurgus, a king of *Thrace*, observing the bad effects of wine amongst such of his subjects who drank it to excess, had all the vines in his kingdom cut down, and destroyed. Can any one applaud that king's contrivance, as a piece of wisdom? or was it not rather a foolish and frantic act? The same must be applied to the above subject; for as there is hardly any
one

one useful and good thing in the world but what may be perverted to bad purposes; so the abuse of Paper and Writing is a poor argument against the general and great utility thereof. There have been some persons like *Lycurgus*, of *Thrace*, of this erroneous way of reasoning, with regard to letters; *Thamus*, an ancient *Egyptian* king, as is stated in *Plato's Phædrus*, remonstrated against the use thereof; as also against the reception of the useful parts of the mathematics, when *Theut* offered to introduce them amongst his subjects. *Licinius*, a *Roman* emperor likewise, was a great enemy to letters, and used men of learning and philosophers with outrageous cruelty, calling them *the bane and pest of society*. But these must be looked upon as the extravagant notions and whims of ignorant persons who obstinately glory to deviate from common sense and the judgment of mankind; and therefore ought to be no further regarded,

than

than for their singularity, and the absurd consequences that attend them.

Another pretext against the use of Paper and Writing seems to be more plausible than the former is, that it is an encouragement to a lazy disposition. The objector says, if we trust too much to books, or only write out what we ought to commit to our memories, we may in that be said to lean to a broken staff; and be apt to imagine ourselves more learned and knowing than in reality we are. It is not the possession of an extensive and beautiful library with learned books that makes a man wise and learned; nor a superficial manner of reading them over, or even making extracts from them, by way of a common *memorandum* book, that will enable us to speak pertinently upon subjects, of which we wish to have the appearance to be masters. Nothing but a fund in the memory, a large stock of good observations, and the
real

real *basis* of knowledge, gained by diligence and experience carefully gathered and laid up there, can enable us to set up as traders in literature. Otherwise, we suppose ourselves to be great scholars in the same manner as an empty, vain-glorious man, whom *Seneca* mentions, did: (*Calvisius Sabinus*). As he was rich, he hired into his house several servants, that were well qualified in several sorts of *learning*; and on *this stock* he set up for a person of *erudition*; so that he could resolve by them almost any question in the circle of literature that was started amongst his visitants.

Just so may be said, that the relying on books, the product of writing on Paper, gives the mind a turn to an indolent habit; and takes it off from that industrious pursuit and attention, by which a mature knowledge of arts and sciences are the most properly and surely gained. This objection must be allowed in its full force, but

nevertheless the knowledge of letters cannot be the real cause of such indolence, or deficiency in the improvement of our natural powers and faculties. The noble inventions of Paper and writing can, therefore, by no means be accused of encouraging sloth or negligence; but, if it be made a right use of, it is undeniably of special assistance to mankind in their literary pursuits and acquisitions. For where is the memory, however well cultivated, that does not fail the owner sometimes in particular circumstances? and then to have recourse to the subsidiary aid of writing on Paper, must be allowed to be of singular advantage. A person may sometimes remember very well a quotation, or a story, but may, even for the moment, not be able to recollect the author's name, which is often required to an illustration; is in such instance a good library therefore not a beneficial resource? Is here not fully proved the usefulness of Paper and Writing?

ting? Let none, therefore, lay that blame upon the use thereof, which more justly belongs to their own wrong way of reasoning; for it can no way encourage idleness, but rather opens and exhibits an ample field, in which the industrious may advantageously employ themselves with honour and credit, if it be applied to the various good purposes for which it is most truly adapted.

Mr. *Robert More* gives a definition of writing in the following words: *Writing*, (says he, in his short essay upon the invention thereof,) *is such a representation of our words, but more permanent, as our words are (or ought to be) of our thoughts.* He states that the various combinations of twenty-four letters (and none of them repeated) will amount to

620,448,401,733,239,439,360,000.*

* These figures are right; and I join here, for the use of those who wish to be informed, the calculation,

Writing, in the most ancient language
that

which is done by multiplying all the twenty-four
figures one with another.

$$\begin{array}{r}
 1 \\
 \text{by } 2 \\
 \hline
 2 \\
 \text{by } 3 \\
 \hline
 6 \\
 \text{by } 4 \\
 \hline
 24 \\
 \text{by } 5 \\
 \hline
 120 \\
 \text{by } 6 \\
 \hline
 720 \\
 \text{by } 7 \\
 \hline
 5040 \\
 \text{by } 8 \\
 \hline
 40320 \\
 \text{by } 9 \\
 \hline
 362880 \\
 \text{by } 10 \\
 \hline
 3628800 \\
 \text{by } 11 \\
 \hline
 39916800 \\
 \text{by } 12 \\
 \hline
 479001600 \\
 \text{by } 13 \\
 \hline
 6227020800 \\
 \text{by } 14 \\
 \hline
 87178291200
 \end{array}$$

that we know of, is called *Dikduk* דִּקְדּוּק, which

	87178291200
by	15
	1307674368000
by	16
	20922789888000
by	17
	355687428096000
by	18
	6402373705728000
by	19
	121645100408832000
by	20
	2432902008176640000
by	21
	51090942171709440000
by	22
	1124000727777607680000
by	23
	25852016738884976640000
by	24

620,448,401,733,239,439,360,000

Clavius, the Jesuit, who also computed these combinations, makes the number to be but

5,852,616,738,497,664,000

which seems to be an error of the press, and that he calculates only 23 letters in his alphabet, and the misprinting appears only in a few figures

25,852,016,738,884,976,640,000

which it is said signifies *a subtle invention*; and so it really is, and appears to be, if we do but reflect, as *Tully* observes in his *Tusculan Questions*, that the *sounds of the voice, which are in a manner infinite, are represented by a few marks or characters, which we call letters*. These letters in Hebrew are called *Othioth*, אותיות, that is, *Signs*; being the signs, or representations of our words, as is expressed in the foregoing definition.

But it may not be amiss here to take notice, that it is not absolutely necessary that there should be just such a precise number of letters, twenty-four, neither more or less, to express all the words in a language. The alphabets of various languages shew the contrary. The *Hebrew*, *Samaritan*, and *Syriac*, have twenty-two; the *Arabic*, twenty-eight; the *Persic*, and *Egyptian* or *Coptic*, thirty-two; the present *Russian*, forty-one; the *Malabar*, fifty-one;

one; the *Japanese* have three alphabets, and forty-eight letters; the *Chinese* have no alphabet, but use near eighty thousand characters; the *Greeks* are supposed to have had but sixteen letters at the first. But the ingenious *Wachter*, in his *Naturæ & Scripturæ Concordia*, has formed a scheme to shew, that ten characters, the number of our fingers, are sufficient for the expressing of all words in all languages; as ten figures, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, are sufficient to all calculations. As this invention of Mr. *Wachter* is at least a curiosity, I have here inserted it.

CONSPECTUS ALPHABETI NATURALIS

Ex Wachteri Naturæ & Scripturæ Concordia, page 64.

GENUS.	FIGURA.	POTESTAS.
Vocal	○	a, e, i, o, u.
Guttur	♀	k, c, ch, q, g, h.
Lingual	∠	l.
Lingual	∟	d, t.
Lingual	┘	r.
Dental	┐	s.
Labial	3	b, p.
Labial	ㄢ	m.
Labial	ㄣ	f, ph, v, w.
Nasal	∧	n.

The art of writing was for a long time entirely unknown in Germany, until the reign

reign of the Emperor *Charles the Great*, and made even very little progress for a number of years after his reign. Contracts and deeds were only registered in very extraordinary cases, and in general confided to the memory of authentic and respectable persons; and in the present time, there is in no country written more than in Germany, which is proved by about one hundred thousand new publications annually; which consume a vast quantity of Paper.

Having shortly noticed the letters invented and adopted for writing and printing, and conveying ideas, sentiments, and improvements in arts and sciences from one to another, I will now give a brief account of the instruments and materials which have been made use of, before I proceed to a history of the materials which have been engraved, printed, and written on.

The instruments were of two kinds; they performed their services either immediately or by the assistance of fluids. To the first belong the wedge, (*cuneus*); the chissel, (*celtes, celten, coellum, caelum*); and the writing fescue, (*stilus, graphium*). And to the second, the writing reed, (*calamus scriptorius, or calamus chartarius*); the pencil; and the quills or pens.

The wedge and the chissel are the most ancient writing instruments; the first inhabitants of the globe formed therewith in wood, stone, and on metal and wax, their images, or representations, hieroglyphicks, and at last their alphabetical letters, which have been mentioned in the Bible in several places; (Job, ch. xix. v. 23, 24. Jeremiah, ch. xvii. v. 1.) On those followed the writing-fescue, which was usually made from iron, and sometimes from ivory, copper, silver, &c. Genteel persons used in general fescues
of

of silver, of which one has been found of Childerich. Those of ivory or bone were used to write on wood and wax; and those made of iron for writing on leaden and copper plates.

These fescues were of different shapes; sometimes large and strong, and small and thin, for other purposes; some were of the shape of pins or needles; but one end was usually blunt and broad, to efface the miswritten letters and words, which were named by the Romans, *stilum vertere*. Some fescues were so large, that they could be used for the same purposes as stilettos; and several authors have noticed, that in many instances they have been employed for committing murder. But it is doubtful, if this be the reason, why the use thereof has been entirely prohibited for some time in Rome. It would be a strange interdiction; and as singular as a prohibition of cords and knives, because

cause they have been sometimes employed for committing murder and suicide.

But such fescues were too sharp for writing on parchment and Egyptian paper, for which reason reeds were employed for those purposes. Pliny says, that the ancients gave the preference to Egyptian reed, (*cognatione quadam papyri.*) Yet many other reeds have been used; and Martinus Crusius states, that the writing reeds from Persia were generally used. When such reeds became blunt by use, they were either sharpened with a knife, or on a rough stone, and such re-pointed reed was named by Cicero *calamum temperatum*.

The reeds were split on the points, like our pens, to lay the colour or ink neater on the paper or parchment, for which reason Ausonius names them *dissipedes*. According to Chardin, the use of reeds is still continued in several Oriental countries,

tries, and not superceded by the introduction of quills. Goguet and others maintain that pencils have been used for writing prior to the introduction of reeds, but nothing can be positively ascertained, except that reeds have been always more abundantly in use than pencils. The Chinese continue still to use hair-pencils for painting their letters. Their ink-stand is a polished piece of marble, with a hole in one corner containing water, in which they dip a piece of ink, and rub it on the marble more or less, according as they wish to make the strokes more black or brighter. They hold the pencil perpendicular, and write from the right to the left, from the top to the bottom. The marble, paper, pencil, and ink, which are all their writing instruments and materials, are jointly named *pau-tse*.

Rauwolff tells us in his Travels, p. 87, (Augsburg, 1573,) that in the Turkish dominions,

dominions, in the shops, canes (for pens) are to be sold, which are small and hollow within, smooth without, and of a brownish red colour, wherewith the Turks and Moors write : for to write with goose-quills is not in use with them. Tavernier also, in one of his voyages, p. 229, tells us, that the Persians use three sorts of hands: set-hand, court-hand, and running-hand; and that they write with small Indian reeds, bearing their hands exceeding lightly. Their ink, he says, is made of galls and charcoal, pounded together with foot; but their paper is coarse and brown, being made of cotton fustian. Sir John Chardin, in his Travels, vol. ii. p. 108, &c. likewise observes, that the Persians, who write from the right hand to the left, hold their paper in their hands, and do not lean upon tables or desks, as we do, and perform their work with dexterity. Worm, in his Museum, p. 164 and 383, tells us, that the inhabitants of Malacca write from
the

the left hand to the right, as we do, upon the leaves of palm trees, some of which are two cubits long, two inches broad, and as thick as parchment; they make their letters, by pricking the leaf with an iron style, which they hold in their right hand, while the leaf is held in the left. The Turks in like manner, who employ a great number of clerks, as they permit no printing amongst them, according to the aforefaid Rauwolff's testimony, oftener write upon their knees than upon desks or tables.

The introduction of quills, of which we make at present our writing pens, according to Isidorus, Montfaucon, and Schwarz, is only one thousand two or three hundred years since; and those who say that it has been noticed by Juvenal are as erroneous as Christ, who, in his treatise on Literature and Antiquities, states, p. 321, that pens made of quills are only two or

three hundred years in use. In the imperial library at Vienna is a picture, exhibited as a great curiosity, of Aristotle's writing with a quill; and in Rome is the statue from which this picture is copied, with a manuscript written in 1471. If that had been written in Aristotle's time, the statue would have been most likely carved with a reed instead of a quill. Isidorus Hispalensis, who lived about the middle of the seventh century, is the first who used the word *penna* for a writing pen.

Let me here observe, that wherever the word pen occurs in our English translation of the Old and New Testament, we must not understand it of a pen made of a quill, but of an iron style, or a reed; for though our name pen be derived from the Latin *penna*, yet this latter is never used for a pen to write with, in the Roman classics. Bayle, in his dictionary,

tionary, relates a remarkable particular of Leo Allatius, that he having made use of one and the same pen for forty years, in writing Greek, and losing it at last, was ready to cry for grief; but he does not inform us what that pen was made of, nor whether he did not make use of some others between whiles. To give an instance nearer home of a similar case, Philemon Holland, a physician of Coventry, translated Pliny's Natural History into English with one pen, as he says himself in these lines:

With one sole pen, I wrote this book,
 Made of a grey-goose quill;
 A pen it was when I it took,
 A pen I leave it still.

The author of the History of Manual Arts, 8vo. p. 61, says, that a lady, whose name he mentions not, preserved this identical pen in a silver case; so that it possibly may remain in some museum of curiosities to this day.

In all stationery shops in this country are now exhibited for sale various pens made of gold and silver, some of which are very useful, containing ink in such a manner, that a person, by shaking it, is at all times able to write on promenades and travelling, or in libraries, picture galleries, naturalists cabinets, &c. which is much preferable to the writing with black-lead pencils, which rubs out and is obliterated. The mechanic Scheller in Leipzig makes a superior kind. Nevertheless, pens made of goose-quills remain in common use, the consumption of which is now very great in all countries, and are imported in many countries to a considerable amount. Is it, therefore, not surprizing that no greater attention is paid to breed geese more abundantly, as they provide not only pens to write with, but also feathers for our beds to repose easily, and wholesome food for our support?

In the library of the Duke of Brunswick at Wolfenbüttele is an old Greek manuscript of the four Evangelists, in which the pictures of St. Matthew and St. Mark are painted with beautiful colours on a gilt ground. All the ancient writing utensils are here more distinct than in any other work. The ink-stand is therein of a black colour, and close to it a vessel which seems to contain a red liquid.

The sand-box or glass was likewise a writing utensil of the ancients. But they joined also another vessel or glass, filled with a liquid, to attenuate the ink.

The fescue and reed had always a separate conservatory, to prevent their being damaged, which was named by the Latins *theca calamaria*, and *graphiarium*. A puncher was usually joined, which served to point out the commencement and

end of each line, and sometimes the large letters.

The rule, *regula*, *norma*, *canon*, was usually a separate utensil, but sometimes joined in the conservatory. It was used to draw lines, and to divide the sheets of parchment into *columns*. The lines were drawn with an instrument, similar to a demi-circle, with a handle, and leaden or iron points. The same instrument, if of iron, served likewise for cutting the parchment or paper. If it was too sharp, it often cut the parchment. This instrument was named *subula*. Blank lines, drawn either with the fescue or with the *subula*, are discovered in all neatly written ancient manuscripts, and in many records from the sixth to the fourteenth century. The pierced points discovered on both ends of the lines were made with the before mentioned puncher.

Pumice (*pumer*) was likewise a writing material of the ancients, and used to smooth the rough and uneven parts of the parchment, or to sharpen the reed. Pumice has been likewise used in modern times to erase ancient writings, to the destruction of valuable manuscripts, which parchments were again smoothened, and often scribbled over inconsequent stuff, or of less note than it contained formerly, which is the origin of *codices rescripti*. But if the ink had sunk too much in the parchment, remnants of the old letters remained, as is to be seen in the library at Wolfenbuttle, where is preserved an old piece of parchment, from which the Epistle to the Romans was erased, and the copyist had written the Origines of the Bishop Isidorus.

A sponge served to rub out such letters as were written by mistake or inattention on the parchment, and to wipe off or to

cleanse the writing reed. Parchment or paper was cut either with paper-scissars, or the before mentioned *subula*; and all lines were separated at an equal distance with a compass.

The ink that the ancients wrote with, was of various kinds, in the composition and colours, as we have it now. Black, as at present, was the most common; for that reason the Latins called it, *melan, atramentum*. Dioscorides, Pliny, Vitruvius, and Isodorus have acquainted us with the different preparations of the ink which the ancients used, which are not at all similar to the present. Pliny says, that the Romans made their ink of foot, taken from furnaces and baths. Some also wrote with the black liquid that is found in the *sepia*, or cuttle-fish. Dalechamp, in a note upon the aforesaid chapter of Pliny, observes, that the northern nations, (without explaining which he means by that term)

term) write very well with the said liquid, by adding a little alum to it. Jacob Quandt describes the ink of the ancient Hebrews, and in the *Canaparius** published at Venice in 1619, are published a great number of receipts for making the ink of the ancients.

Perfius, the poet, in the following verses, translated by Mr. Dryden, humorously describes a lazy young student, laying the blame of his own idleness upon his writing materials; where he metaphorically puts *sepia* for ink, and uses three different words, in the compass of four lines, viz. *calamus*, *arundo*, and *fistula*, for a pen.

With much ado, his book before him laid,
And parchment with the smoother side display'd;
He takes the papers, lays 'em down again,
And with unwilling fingers tries his pen;

Some

* This book is written in bad Latin, and describes numerous chemical experiments, and was therefore re-published at London in 1660; and at Rotterdam in 1718.

Some peevish quarrel straight he strives to pick,
 His quill writes double, or his ink's too thick;
 Infuse more water; now 'tis grown too thin,
 It sinks, nor can the characters be seen.

The first ink was made of red wine, concentrated by boiling, and of musk named *sapa*; since of mulberry juice; but principally of soot, tempered with some glue or gum, and sometimes, for the preservation of paper and parchment, with an extract from wormwood. The Chinese make ink from lamp-black, obtained by burning different materials, principally of fir wood and oil, of which they make a paste and dry it. All ink made of soot, changed in the course of time, its black colour into yellow, as appears by many ancient manuscripts. But we must not form a decided opinion on the colour of ink with which manuscripts have been written; because we find, in almost all manuscripts of the first fourteen centuries, letters of different colours, from the palest to

to the darkest ; and Wansley justly observes, that amongst ancient manuscripts, of one thousand years and upwards old, are found some written with ink yet darker black than any which we now are able to make. We cannot, therefore, reject the antiquity of a diploma, because it resembles our modern ink.

Our ancestors used not only black ink, but also red ink of different shades and qualities, which was made of ruddle, *rubrica* ; red lead, *minium* ; the juice of kermes, *coccus* ; or of vermilion, *cinnabaris* ; and sometimes purple ink, which was made, with a particular treatment, from boiled purple snails, and their pulverized shells.

Purple ink was very expensive, and therefore not much used*. The writing therewith

* The knowledge of the ingredients used by the ancients in making purple was lost with the conquest of

therewith became in later times a prerogative of the Emperors, that colour being a token of dignity, grandeur, and sublimity. The oriental Emperors signed their edicts and mandates with purple ink, for which reason it was named *sacrum encaustum*; and as late as the twelfth century, they divided that honour with their next relations. The Emperor Leo interdicted the use of the *sacrum encaustum* to all private persons and noblemen; and the regents who governed the state, during the minority of an Emperor, used not purple, but green ink for their signature. Montfaucon notices some Imperial signatures with *sacro encausto*, which is greatly different

of Constantinople, because the purple-manufactures were, since the reign of Theodosius, the great private property of the Emperors, and therefore there remained only one at Tyre, and another at Constantinople. The former place was destroyed by the Saracens and the other by the Turks; and thus this art, with which only a few persons were acquainted, has been lost, and not yet again discovered.

different from the *encaustum* used by the Greeks and Romans for painting.

Josephus says, the Jews had their *thora* with golden letters; and Hieronymus mentions that in his time has been written with gold; which yet is copiously done in Egypt, according to Maillet's description of Egypt, vol. 2. p. 192. It is well known, that the Persians, when they write to their superiors, to whom they wish to shew in their letters high veneration, write on white paper with gold flowers; and they paint the name and title with gold letters.

The gold ink has been prepared different ways; the customary method has been, to mix pure gold and silver in a crucible over the fire, adding porphyrian marble and sulphur, after it has been converted into fine powder, and digested over a slow fire in an earthen well-covered vessel.

vessel. The whole was then put into the same well-covered earthen vessel, and kept on a slow fire until it was red. When cold, it was pounded in a marble mortar, with plenty of water; when settled, that water was poured off, and other water used until it was found thoroughly clean. If wanted for use, a part thereof was taken the day before, and some gum and water added, and, when used, made milk-warm.

Constantine the Great ordered fair-hand-writers to make fifty copies of the Bible on parchment, under the direction of the Bishops Cæsarea and Eusebius, which have been since copied at different times with gold letters by command of his successors.

At Hervorden is preserved a manuscript written with gold letters, found in the grave of Wittekind.

In

In the cathedral of Aix la Chapelle is a part of the New Testament written with golden letters. It was put into the grave of Charles the Great at the time of his burial, but the Emperor Otto the Third ordered it to be taken out in the year 1000, which was 186 years after the death of Charles. This book is remarkable because the Emperors of the Roman empire were bound at their coronation to make their oath by laying their fingers on the first page of St. John the evangelist. It is in a large quarto size, and was elegantly bound 400 years after the death of Charles the Great, and is, with the cover, about three inches thick. The leaves are all of a violet-colour, and the gold colour of the letters is tolerably well preserved. The book contains the writings of the four evangelists; but all that which belongs not to the text, is written with silver letters, and not so well preserved. The whole

is very neat, but not divided into chapters and verses; it is *in una serie*, without any stops, points, or other marks of distinction; without capital letters or ornaments: the letters are however all of one size, and the words without abbreviations. It seems to be written either at the latter end of the eighth, or the commencement of the ninth century. The several accounts given of this book are contradictory. Koehler erroneously asserts that it is written on bark-paper, but it is certain, and I am eye-witness by examination, that the leaves are thin parchment. If this book has not been taken away before Aix la Chapelle was Frenchified, I am at a loss to know in what manner any future Emperor can be constitutionally crowned, because, according to the constitution of Germany, several insignia are required at the coronation of an Emperor, which are gathered together from several places, and brought solemnly
to

to Francfort on the Main for the use of the coronation.

Another book of the Evangelists with golden letters is in the convent of St. Emeran, at Regensburg: it is on one side with gilt plate, ornamented with diamonds; and given by the Emperor Arnolphus to the holy Emeran, before he died. It is publicly exhibited in the church of the convent on all holy days.

In the Imperial library at Vienna, and in the library of the convent of St. Gallen, are the Psalms of David, written with golden letters. In the last century, there was, in the library of the Monkhouse family, near Schaumbourg, the whole Bible written in golden letters, given to that family by Sophia the First, Abbess of Gandersheim, daughter of Otto the Second. And in the year 1788, Ettingen, a bookseller of reputation at Gotha, offered for sale

a very neat manuscript, containing some chapters of the Alcoran, written with gold letters, in the Arabic language.

The following records are further preserved. The diploma of Otto the Second, in the archive of the minister at Ganderheim. A record of the Emperor Henry the Second, in the bishopric of Paderborn in Westphalia. Another of Conrad the Third; and one of the Emperor Frederick the First; both in the abbey of Corvey. And in the three confirmation bulls, of the privileges of the church of Rome, given by the Emperors Otto the First and the Second, and Henry the Saint; and further, in the marriage compact of the Emperor Otto the Second with Theophania; and in the chart of Lotharius the Second, which he delivered to the Abbot Wiblo at Stavelot, the gold has not been spared.

In the vaults of a destroyed temple at
Semipalat,

Semipalat*, in Siberia, have been found several rolls of blue and black coloured paper, entirely written on, with gold letters. They were delivered to the Czar Peter the Great, who could not discover in his empire one single person who was able either to read or to translate these neatly written and well-preserved manuscripts. One of these rolls was therefore sent to Paris by Schumacher, librarian of the academy at Moscow, to the Abbot Bignon, who was in great repute, and was librarian to the King of France, soliciting him to find out a learned person, who was able to state in what language the roll had been written, and to develop the contents. The Abbot Bignon shewed it to Fourmont, interpreter to the king, who was said to be master of the Chinese and

* Semipalat, which is situated on the river Upper Irtysh, still retains its name, and that from seven palates, or apartments, which are there among the ruins.

and other oriental languages. This bold grammarian, who had never before seen similar letters, and relying in full confidence on the fame of his great knowledge of the oriental languages, led by vanity, had the impudence to hold out, that he was the only person capable of translating the writing. He asserted, it was written in the ancient Tangutian language, and delivered a fictitious translation, composed by his own fancy. Peter the Great, who doubted the correctness of the translation, nevertheless made him a very considerable present, and thereby increased his fame. But in the reign of the Empress Ann, many years after the death of Peter the Great, two Russians appeared at the academy of St. Petersburg, who, during a residence of sixteen years in Pekin, had learned the Chinese and Mantchurian languages. They recognized immediately, that the writings of all the rolls were in the Mantchurian language; they read them

them without hesitation and difficulty; they translated several, and amongst others the roll, formerly translated by the Frenchman Fourmont. But not a single word agreed with his translation; and it was fully ascertained, that Fourmont had been an impostor, who did not know a single letter of the roll. The original rolls are still preserved in the academy of sciences at St. Peterburgh, with both translations; and are, according to Jacob von Stæhlein, permitted to be seen by every one who enquires for them.

Similar rolls of smoothed blue paper, written in part with golden, and in part with golden and silver letters, with the holy characters of the Tibetans, were in Sloane's library, and marked with the numbers 2836 and 2837. They were found beyond Siberia, in the south-eastern part of Tartary.

Manuscripts written with silver letters are more scarce. A few are yet existing. One of Gregorius Nazianzenus was in the King's library at Paris, wherein all quotations from the holy Scriptures were written with golden letters, and all other parts in silver. The Psalter of David is in the library at Zurich, written with silver letters on purple-coloured parchment in the seventh century: the title is written with golden letters. The manuscript of the Gothic translation of the four books of the evangelists, by the Bishop Ulphilas, who lived in the year 350, is preserved at the university of Upsal. All the letters are silver, except the capitals, which are gold. According to Mabillon and Gatterer, diplomas written with silver letters are not in existence.

It is of consequence to mankind in general that writings may be preserved; which depends on the strength of paper
and

and parchment, and on such a durable black ink, as will not fade by age, nor obliterate in water. Aistle, in his Origin and Progress of Writing, says, "It is an
 " object of the utmost importance that
 " the records of parliament, the decisions
 " and adjudications of the courts of justice,
 " conveyances from man to man,
 " wills, testaments, and other instruments,
 " which affect property, should be written
 " with ink of such durable quality, as
 " may best resist the destructive power
 " of time and elements. The necessity
 " of paying greater attention to this matter
 " may be readily seen, by comparing the
 " rolls and records, which have been written
 " from the fifteenth century to the
 " end of the seventeenth, with the writings
 " we have remaining of various ages from
 " the fifth to the twelfth centuries. Notwithstanding
 " the superior antiquity of the latter, they are in excellent preservation;
 " but we frequently find the

“ former, though of modern date, so
 “ much defaced, that they are scarcely
 “ legible.”

Several experienced chymists have endeavoured to discover a durable black ink, and to prepare paper for lasting writings; which induces me to acquaint the publick with their processes. Lambert recommends “ to pound the gall-nuts in an
 “ iron mortar to very fine powder, and
 “ to pour three or four times its quantity of water on it; to let it remain
 “ eight or ten days in the sun, or to
 “ boil it for half an hour or longer, according to the quantity. To dissolve
 “ iron-vitriol, to be strained and added
 “ to the dissolution of galls, till the ink
 “ attains the desired black colour. Too
 “ small a quantity of vitriol produces a
 “ brown reddish colour; if more be added,
 “ a violet; then a black hue, and at last
 “ a dark black. If the colour of the
 “ ink

“ ink be not sufficiently dark, he re-
 “ commends to thicken it by boiling, and
 “ then to add gum in such a quantity
 “ that the ink may be neither too fluid
 “ nor too tough.” The ink is always of a
 superior quality, if made sufficiently aqueous
 when prepared, because by adding water
 a portion of the fine black particles will
 precipitate. Lambert defines not the
 quantity of the ingredients, and they are
 not always of the same quality. Lewis
 proposes to take three ounces of galls
 to one ounce of iron-vitriol; but Lambert
 recommends to take less vitriol, to prevent
 the paper from turning yellow. Experi-
 ence proves daily, that with one and the
 same ink written on different paper, dif-
 ferent shades of black are produced; and
 this must originate in the lime and glue
 used in the paper-mill, or if the paper
 or rag has been bleached by a chymical
 process. An ink which as far as it pos-
 sibly can be done retains its dark colour
 on

on every kind of paper, is the most preferable.

Augustus Lewis Pfannen-smith in Hano-ver has invented a black ink, which, by trial, is found to be superior to all others: it is different from all other inks hitherto known, because,

1. It is entirely made from such productions of the country, as can be procured abundantly and cheap, without using galls and gum.

2. The writing done with this ink cannot be destroyed, by oil of vitriol, spirit of salt, spirit of nitre, salt of lemon, salt of sorrel; nor by any alkalies, which can only alter its colour in a small degree, either yellowish or reddish.

3. The writings with this ink alter not by time, or if exposed to the air and heat of the sun.

4. It

4. It can be prepared like the Chinese ink in dry cakes, and is therefore convenient for exportation and travellers.

Its preparation is as follows: “ One
 “ peck of foot, and one and a half peck
 “ of wood-ashes, is to be boiled with four
 “ or five pails of soft water, whereby the
 “ alkaline salts extracted from the ashes
 “ dissolve all those parts of the foot
 “ which are capable of dissolution. This
 “ is poured altogether into an empty
 “ hoghead, and filled up with water; it
 “ must remain there for twenty-four
 “ hours, constantly stirring the clear li-
 “ quid, which is of a brown colour; it is
 “ then drawn into another cask of the
 “ same size. About thirty or forty pounds
 “ of oak bark, with four or five pounds
 “ of Brazil wood shavings*, are to be
 “ boiled during three or four hours with
 “ as much water as is sufficient to cover
 “ the

* This wood is not absolutely necessary.

“ the ingredients. The extract is to be
 “ filtered through a cloth, and put into
 “ another vessel. Six pounds of iron of
 “ vitriol is to be dissolved in six pounds of
 “ soft water. To this dissolution is to be
 “ added a pail full of cold water, and put
 “ into the cask which contains the brown
 “ liquid. The alkaline salts extracted
 “ from the ashes which were necessary
 “ to dissolve the foot, and from the ex-
 “ tracted vitriolic acids, mix with the
 “ water ; and the dissolved parts of the
 “ foot, the iron and earthy parts of the
 “ vitriol, with the colour and gum ex-
 “ tracted from the oak bark, and Brazil
 “ wood shavings, form a mixed precipitate.
 “ It is therefore required to separate the
 “ alkaline lie from the acid, which is
 “ accomplished by adding as much clean
 “ water as is required to fill the hoghead.
 “ It must be well stirred, and left three
 “ or four days to settle, in which time
 “ the united precipitate is settled at the
 “ bottom.

“ bottom. The clean water on the top
 “ must then be drawn off, and thrown
 “ away. The cask is then to be filled
 “ again with fresh water, so far as to
 “ receive one pail full of water more. In
 “ the pail with water required to fill the
 “ cask, twelve ounces of iron-vitriol is to
 “ be dissolved, which is stirred and
 “ poured into the hoghead. The last
 “ process is necessary to facilitate the
 “ second precipitation, which is otherwise
 “ more difficult than at the first time.
 “ Within two days it is again settled;
 “ the water is then to be drawn off from
 “ the top. A wooden frame must be pre-
 “ pared, on which is slackly to be fastened
 “ a piece of half-bleached fine linen cloth;
 “ the frame must then be placed on sup-
 “ porters as horizontally as possibly can
 “ be done, and a pail full of the preci-
 “ pitated colour is then slowly to be poured
 “ upon the straining cloth. Some coloured
 “ liquid will at first run through, which
 “ must

“ must be saved, but the clear water which
 “ comes afterwards is to be suffered to run
 “ away ; then continue to add more of the
 “ precipitate, as much as the strainer will
 “ hold, and only clear water will drain off.
 “ Within two or three days the colour
 “ appears on the cloth, resembling pap,
 “ which is to be taken off, and well stirred
 “ with a few pails full of clean water in
 “ a wooden tub, and again poured into
 “ the hoghead, which is again to be filled
 “ with clean water, and twelve ounces of
 “ iron-vitriol added in the same manner
 “ as heretofore described. The whole is
 “ then stirred, time is given to precipitate,
 “ and the colour strained on the frame.
 “ The reason, why (throughout the whole
 “ of this process) it is prescribed to use re-
 “ peatedly such a large quantity of water,
 “ is to clean the dissolved foot as much as
 “ possible, and to obtain the united preci-
 “ pitate from the extract of the oak-bark
 “ and the iron-vitriol in the finest state,
 “ which

“ which principally contributes to the
 “ durability of this ink, and impresses
 “ deeper into the interstices of the
 “ paper. The repeated adding and draw-
 “ ing off of the water is necessary to
 “ carry off the vitriolic acid as much as
 “ possibly can be done. Now, for the
 “ last time, take the ink-pap from the
 “ frame and add an alkaline-lie, prepared of
 “ two pounds or two pounds and an half of
 “ American pot ash, dissolved in the same
 “ weight of water, and six ounces of com-
 “ mon salt dissolved in water, which is to
 “ be heated altogether in a boiler, con-
 “ stantly stirring it. If to this is added
 “ six quarts of malt-vinegar, well stirred,
 “ a very durable and good ink is obtained.
 “ The slimy parts of the vinegar are of
 “ use in this preparation. Should it happen
 “ that the ink prepared in this manner
 “ should turn out of a yellowish shade,
 “ the foot has been of too rich a colour,
 “ and there should have been taken less

“ in

“ in proportion to the colour extracted
 “ from the oak-bark. The last directed
 “ use of pot ash, which in the first part
 “ of the process has been prescribed to
 “ detach, serves now to dissolve again all
 “ the parts of the foot yet remaining in
 “ the mixed precipitate, and thereby to
 “ give the ink a greater power to impress
 “ into the paper; and to promote the
 “ durability of the colour, serving at the
 “ same time as gum. To form this ink
 “ into cakes, a number of flat stones
 “ should be placed in such a manner,
 “ that they may be easily heated. Some
 “ of the ink is to be poured thereupon;
 “ and when evaporated more is to be
 “ added, constantly stirring until formed
 “ like a paste, which is to be taken from
 “ the stone plates, and laid on a warm
 “ place, till sufficiently dried. If wanted
 “ for use the cakes are to be pulverized,
 “ and converted into good ink, by the addi-
 “ tion of some boiling water.”

To

To prepare paper for lasting writings is a valuable addition in the art of making paper; and the new manufactory, now building at Millbank, for manufacturing paper from straw and other vegetables, will be shortly in a state to provide the publick sufficiently with paper expressly manufactured for that purpose.

As perhaps the patience of the reader may be tired with the long but necessary process of making an everlasting black ink, I join for his recreation receipts for making the best and most lasting coloured inks.

For Red Ink:—Take four ounces per-nambuco wood shavings of the best quality, boil it with half an ounce of alum in a quart of rain water, during one hour; when strained, add a little gum Arabic.

In the same manner different coloured inks can be made from all known dyeing

woods. Yellow-wood will produce yellow ink; Brazil-wood, violet ink, &c. But all inks made from dyeing wood will be more beautiful and lasting, if a small dissolution of tin is added to it, which is to be prepared as follows: dissolve in four ounces of the strongest oil of vitriol, half an ounce of sal armoniac, and as much tin as will dissolve; or mix *spiritus salis* with *spiritus nitri*, and dissolve in it as much tin shavings as will dissolve, if it even should take up two or three days, which solution, if kept in a glass phial, will last many years. All inks made from boiled dyeing wood may be mixed, and thereby obtain numerous shades of different beautiful colours: but care must be taken never to use in these inks a pen dipped in black ink, because the particles of iron, which are a property of black ink, will spoil all other coloured inks.

For Green Ink:—Pound three ounces of verdigrease and two ounces of white tartar in sixteen ounces of water for twelve or fifteen minutes; when strained add two ounces of gum Arabic.

For Blue Ink of the greatest beauty and durability:—Pound two ounces of the best Prussian blue (Berlin blue), and pour on it two ounces of spirit of salt, mixed with two ounces of water: keep it milk-warm, and stir it till the blue is dissolved, which will take place in three or four hours. The vessel must not be too small, because the mixture will at first ferment and rise. It is afterwards attenuated with more or less water, according to the shade of blue you wish to have. No gum Arabic is to be added.

The diplomatics name, besides metals, five other materials, used for the impression of seals, and for sealing letters and

other things, to wit, *terra sigillata*, putty, paste, wax, and sealing-wax.

Notwithstanding Pliny denies that seals have been used by the ancient Egyptians, it is nevertheless proved that they were well acquainted with the use of the *terra sigillata*, which was, according to Herodotus, the first stuff employed for that purpose. He says, that the Egyptian priests bound on the horns of the animals selected for immolation, a piece of paper, on which they impressed their seals on *terra sigillata*, and those animals marked in that manner could only be taken for sacrifices. Moses mentions likewise the seal-ring of Pharaoh. Lucian says that all persons who went to fortune-tellers, were obliged to write the queries on a ticket, which must be folded up and sealed with wax or *terra sigillata*. Cicero, Servius, and others say that the same has been used by the ancients; and it seems that

that the same earth has been used for sealing by the Byzantine Emperors, because some person attempted to defend the worshipping of images, by stating, that no person who received a command from the Emperor, and kissed the seal, did it to shew veneration to the parchment, the lead, or the *terra sigillata*, but to shew his respect to the Emperor.

The earth which is now by us named chalk, cannot have been the *creta* of the ancients, which they used for sealing, it must have been of the clay kind, which only takes impressions, and retains the same when hardened by drying. That the Latins have often expressed a kind of clay by the name of *creta* has been proved by Columella, Virgil, Varro and others.

Wax has been used for sealing in the most ancient times in Europe; but whether

white or yellow was first used is a point on which the diplomatics differ. Gatterer says that the wax which was first used for sealing was white, but Beckman declares that the yellow was the first and generally used, at least by private persons, being the cheapest; and I cannot help deciding in his favour, because the progress of arts was very slow in ancient times, which induces me to believe that many years passed before the art of bleaching wax was discovered. After it was found out that the yellow colour of wax could be converted into white, it was soon coloured red; but green and yellow wax was not known in Germany before the fourteenth century.

That the Constantinopolitan patriarchs, the high-master of the Teutonic-order, the grand-master of the knights of Malta, and some of the first nobility, used the black colour for their seals, is, according to

to Gatterer, Thulemarius, Heineccius, and Hanselman well known; but, that the masters of the Templars used the same colour for sealing, we are informed of solely by Dr. Christopher Smith, otherwise Phiseldek, who states, that there is preserved in the archives of the Duke of Brunswic at Wolfenbuttle, a document, written by Master Widekind on parchment, on which hangs a black seal on blue and white linen thread.

Blue sealing wax was unknown in former times, notwithstanding it is stated by Struvius, that the Emperor Frederick the Third granted Hans Schenk, Lord at Tuutenberg; and by Heineccius, that the Emperor Charles the Fifth granted in 1524 Dr. Stockhammer in Nuremberg, the privilege to use blue wax for their seals. We may say, that the art of dyeing wax blue, is still a secret. No receipt for making it is to be found in any ancient

work; and the receipts given by modern authors, by Le Pileur d'Apligny and others, produce no blue, but a dirty colour, which is neither green nor blue. The coloured juices, when united with wax, make it more greenish than blue; and if mineral-earths are used, they will not unite with wax, and settle at the bottom. If therefore a seal of blue wax could be produced, of which the external part has not been coloured, such a curiosity would puzzle the technologists and diplomats, and be a problem for our chymists. The privileges which have been given to Schenk and Stockhammer are therefore similar to other privileges which have been granted in the year 1704 to the county of Reinstein and the principality of Halberstadt, not only to work in their mines minerals, but likewise indigo. By these privileges the Lord and Doctor could find as much blue wax, as the others could melt indigo from oar found

in their mines. Nevertheless, Beckman does not give up the hope, that the art of dying wax blue will yet be discovered, although all trials have hitherto been unsuccessful.

The use of wafers is more modern than the use of seals; and no ancient diploma is to be found sealed with wafers. The most ancient is not two hundred years old. Spiefz could not discover any one older than of the year 1624; but Martin Schwartner found, in the university library at Pest, three somewhat older; one is a passport, given by Father Visitator to three travelling Jesuits, dated Brussels 1603; the impression on the wafers is the usual inscription on the Jesuit seals.

Paste has been used for sealing letters before the discovery of sealing-wax. Some learned men tell us of a seal-putty, named *maltha*, manufactured from combustible and
rising

riſing compositions. If this aſſertion is founded on truth, it has been the firſt and moſt ancient ſealing-wax. The ſealing-wax now in uſe is compoſed of ſimilar materials, and has ſuperſeded all ancient ſealing matters by its cheapneſs, convenience, and beautiful appearance, notwithstanding its brittlenefs, and that an impreſſion on it can be eaſily forged.

The moſt ancient mention of ſealing-wax in books is found in *Garcia ab orto aromatum & ſimplicium aliquot hiſtoria*, printed in 1563, where by gum-lac the ſticks for ſealing letters are noticed. In *Nouveau Traité de Diplom.* t. iv. p. 33, is ſtated, that Francis Rouſſeau, a Frenchman, was the inventor in 1640. It is ſaid that Rouſſeau, after many years reſidence in Perſia and India, returned to France, where he loſt all his property by fire, in the latter part of the reign of Lewis the Thirteenth, and then eſtabliſhed a manufactory for
making

making sealing-wax from gum-lac*, which he had learned in India. But this Frenchman is not intitled to the invention; which has been already used between the years 1550 and 1560, as can be proved by letters sealed with black and red sealing-wax preserved since 1554 in the archives at Dillenburgh. Spiezf states, that there is one on a diploma of 1563 in Anspach; and Anton has seen in Goerlitz one of 1561 sealed with red sealing-wax; and another of 1620, with black sealing-wax.

Tavernier

* The insect which produces the gum-lac is a red shield-louse, *coccus lacca*, not yet described in any natural history known to me. It sticks fast to the branches of the *ticus religiosa*; *indica*, *rhamnus jujuba*, *plaso hort. malab.*, and soon appears on the edge of the body a demi-transparent glue-like humidity, which shortly forms a complete cell. These cells are the gum-lac. The white substances which are found in the empty cells are the striped hides of the young insects. It is plentiful on both shores of the river Ganges; and one hundred weight has formerly been sold at Dacca for twelve pounds. The most preferred is dark red. The inhabitants of these countries make rings and beads of gum-lac, which they gild and paint, to ornament the fingers and arms of their wives.

Tavernier mentions the preparation of fealing-wax in the East Indies; and it is probable that the Portuguese learned the art of making fealing-wax in the oriental countries. Its first name has been Spanish wax, and the French still call it *cire d'Espagne*; and it seems that it got the name of fealing-wax since gum-lac has been used in place of common rosin. Without gum-lac no fealing-wax can stick to well-sized and glazed paper.

Copyists, illuminators, and book-painters, had full employ before the art of printing was invented; but so much has been written and printed on this, that it would be useless to notice it in this work; and there are so many nominations of the ancient writers, that the statement of it alone would fill a book. Whoever wishes to be convinced of this, has only to examine Hermanus Hugo *de prima scribendi origine*, and the Brunswic Notices of 1750;
and

and for modern times, full information is to be obtained from Massey's Origin and Progress of Letters. I shall therefore only notice the names given to the principal writers.

All copyists were named by the Romans *librarii*, and sometimes *scribis*. *Bibliopolae* were persons who kept a number of servants to write down their own works and dictations, and copied the works of others. *Calligraphi* were fair hand writers. *Tachygraphi*, quick hand writers, and sometimes short hand writers; they were likewise named *exceptores*. Secret writings were described by *kryptographi* or *steganographi*. The Turks call secret writings *selam*. Monks replaced afterwards the *librarios*. Remarks written on the edges of manuscripts were called *glossmata*. *Examinantes* were persons who overlooked the works of the copyists, to which they signed their names. The art of printing here shews its

its great superiority, because all copies are the same as the first. *Illuminatores* painted some letters and other ornaments of books.

Of the noble invention of printing*, I likewise pass, and continue with making some few observations on books and book-binding, and on their being so much exposed to be destroyed by moths and worms.

The ancients, according to Pliny, used to preserve their parchment, paper, and books from moths, by washing them over with cedar or citron oil, which gave them at the same time an agreeable scent. These books were named *libri cedrati* or *citrati*. He believes that the preservation
of

* It is surprising that the art of printing books was not earlier invented, as it is well known that the Romans were in the habit of stamping the initials of their names on the bread which they sent to the public ovens for baking, which is certainly a kind of printing.

of the books found in the grave of Numa was solely attributed to this precaution. In modern times, many preservatives for books against destructive insects have been proposed; but none have yet been effective. The Royal Society of Sciences at Gottingen thought it therefore of sufficient consequence to propose in their assembly at the 10th July, 1773, a premium for July 1774, to be given him who delivered the best answer to the following question: How many kind of insects are found which are detrimental to records and books? which, of the materials, as pap, glue, leather, wood, thread, paper, &c. were attacked by each kind? and, which is the best and most approved remedy, either to preserve records and books against insects, or to destroy the insects?

Among the numerous answers received, Dr. Herman of Straßburgh obtained the premium, and Flad of Heidelbergh got the

the *accesfit*. I will give an abridged extract of their answers. Many insects are charged with injuring books without doing mischief, such are: *acarus*, *cimex personatus*, *lepisma saccharina*, *tinea vestianella*, *tinea pellionella*, *tinea sarcitella*, *attelabus mollis*, *attelabus formicarius*, and *attelabus apiarius*; of the following it is not yet fully ascertained if they are guilty or innocent;

1. *termes pulsatorium* named also the small pumice, the timberfow, the book-louse, and the paper-louse;
2. *phalangium cancroides*;
3. *blatta orientalis*;
4. *ptinus fur*;
5. *tenebrio molitor*;
- and 6. *phalaena*, or *tenia grannela*.

The truly destructive insects are, *ptinus pertinax*, *dermestes paniceus*, *dermestes lardarius*, *dermestes pellio*, and *byrrhus musaeorum*. To preserve the records and books against insects and to destroy them, it is proposed 1. to abolish the binding books with any wood; 2. to recommend the bookbinder to use glue mixed with alum in place of paste; 3. to brush all worm-eaten

eaten wood in the repositories of books with oil or lac-varnish; 4. to preserve books bound in calf, he recommends to brush them over with thin lac-varnish; 5. no book to lay flat; 6. paper, letters, documents, &c. may be preserved in drawers without any danger, provided the wafers are cut out, and that no paste, &c. is between them; 7. the bookbinder is not to use any woollen cloth, and to wax the thread; 8. to air and dust the books often; 9. to use laths, separated one from the other one inch, in place of shelves; 10. to brush over the insides of book-cases and the laths with lac-varnish.

The paper in North America is speedily destroyed by dampness and insects, which, on the suggestion of an honorary member, Mr. François at Neufchatel, induced the Society of Sciences at Philadelphia, in their Assembly of the 11th May 1785 to offer a premium for the best answer

on the question: if there was no effectual remedy to protect paper against insects? This society offered another premium of twenty-five moidores for the best method of making paper for St. Domingo, which would resist insects, and requested to have samples to prove its quality. Several answers and samples were received, but all recommended to mix the size, on sizing, with sharp and bitter, or other ingredients which might kill the insects, to wit, vinegar, allum, vitriol, salt, turpentine, extract of aloes, tobacco, or wormwood; camphor, asafœtida castoreum; and arsenic, either [to be used in the size, or afterwards impregnated by infusion. But these remedies were all rejected, and considered to be either insufficient, or pernicious and dangerous; for which reason, the society renewed their offer, without limiting their answer to a precise time, but without any satisfaction, except that Mr. Arthaud, Royal Physician at Cape François, named the

the insects which were the most destructive to paper in these countries: *dermestes scutellatus*, *nigro testaceus*, *ovatus*, *glaber*, *clytris thorace punctis impressis*, *oculis nigris punctatis*, *antennis curvatis*, *apice articulis tribus perfoliatis compressis*, which generates in all seasons during the whole year, and is considered as the most dangerous of all paper-eaters.

To prepare paper for preservation against insects, is likewise an object to which some of the proprietors of the new manufactory now building at Millbank have paid particular attention; and they flatter themselves they will likewise be able to bring to sale, and to lay before the examination of scientific men, and the publick at large, paper, in this view much superior to any other heretofore manufactured.

Paper is likewise used for filtering; and

that now employed for that purpose is the common blotting paper, which is very tender, the publick are therefore herewith informed that this inconvenience is likewise remedied, and at the Neckinger-mill is now manufacturing a paper, superior to any other, in strength and durability, for the purpose of filtering, and sold by the bundle, or two reams, for a moderate price; which paper has been examined, tried, and approved of by Dr. Crichton and other experienced chymists.

I finish now these accounts and observations which I thought proper to add to this work, and I proceed with the historical account of the substances which have been used to describe events, and to convey ideas, from the earliest date to the invention of paper.

In the most ancient time, when writing was not yet discovered, very simple means were

were used to preserve the remembrance of important events. Tradition represented, therefore, during many centuries, what now is more completely effected by writing and printing. Trees were planted, heaps of stone, or unornamented altars and pillars, were erected, plays and festivals were ordered, and songs sung to keep up the recollection of past facts. The sacred history mentions, that the Patriarchs erected altars or heaps of stones as remembrances of past events.

Rough stones and stakes were the first reminding letters of the Phœnicians. In the environs of Cadiz, several heaps of stones have been found; monuments of Hercules's expedition against Spain. The ancient inhabitants of the North placed, in different situations, stones of an extraordinary large size, to remember great events. And we have found, in modern times, that the savages in America do the same; and

some place bows on the tombs of men, and mortars with pestles on the tombs of women. It has been likewise a custom to give names to certain places, and their environs, which referred to the transactions and deeds which there took place.

Since the art of writing was invented, several materials have been used, on which was engraved or written what was wished to be conveyed to posterity. But nothing positive can be ascertained with respect to the different materials employed by the ancients for that purpose, except that a distinction has been made between public records and private writings. For the first; stones, timber, and metals, were chiefly used; and, for the latter, leaves and bark of trees. The Egyptians, the inhabitants of the Northern countries, and several others, made use of stones, rocks, and pillars, for that purpose.

Job mentions rocks as the materials used in his time; and the Danes engraved likewise upon rocks the deeds of their ancestors.

Josephus has related, that the children of Seth had, before the deluge, erected two pillars, and thereupon engraved their inventions and astronomical discoveries, the one of which was of stone, and the other of brick-clay, because they had heard, from their grandfather, Adam, that the world would be destroyed once by fire, and once by water; and, to prevent their knowledge of the motion of planets, &c. being lost to posterity, they had engraved it on the before-mentioned pillars, the one of which could not be destroyed by water, nor the other by fire; and the same author states, that the same pillar of stone existed still, in his time, in the country of Siriad. But where that country was situated is very difficult to ascertain; some say in Syria. Marsham, Vofz, and others, assert

assert it to be *Seirath*, mentioned in the Scripture, (*Judges*, chap. iii. ver. 26); the most likely supposition seems to be, according to Dodwell, Stillingfleet, and Fabricius, that it was situated in Egypt.

These pillars bring into recollection others more celebrated, erected by Bacchus, Hercules, Osiris, and Sesostris, to commemorate their exploits. But the most famous were the pillars of Mercury Trismegistus, on which his doctrines and rules were engraved with hieroglyphic characters. Porphyrius mentions some pillars in the Island of Crete, on which the sacrificial service of Cybeles, and the religious rites were engraved; and, at the time of Demosthenes, there was still a column of stone existing, on which the code of laws was engraved. Numerous other pillars could be mentioned, but it is sufficiently ascertained, that the most ancient nations were not acquainted with any other method

thod of keeping in remembrance their code of laws, acts and contracts, the history of events, and important discoveries; and these public records have been the sources of knowledge of the ancient authors.

It was likewise a custom to write on bricks, and stone plates, principally to immortalize laws, institutions, and important events.

The Babylonians, according to Pliny, wrote their first astronomical observations on bricks, and the Ostracism* of the Athenians

* The *Ostracism* was invented by the Athenians when they became jealous of Aristides, who at first was loved and respected, and received for his surname *the Just*. But elevated with victories, they thought themselves capable of every thing, and were uneasy to see a fellow-citizen raised to such extraordinary honour and distinction; they assembled at Athens from all towns in Attica, and banished Aristides by the Ostracism; disguising their envy of his character under

nians was sometimes inscribed on oyster-shells,

under the specious pretence of guarding against tyranny. The Ostracism was conducted in the following manner: every citizen took a piece of a broken pot, or a shell, on which he wrote the name of the person he wanted to have banished, and carried it to a part of the market-place that was enclosed with wooden rails; the magistrates then counted the number of the shells, and pieces of broken pots; and if it did not amount to six thousand; the Ostracism stood for nothing; if it did, they sorted them, and the person whose name was found on the greatest number, was declared an exile for ten years, but with permission to enjoy his estate.

At the time that Aristides was banished, when the people were inscribing the names on the shells, and pieces of broken pots, it is reported that an illiterate burgher came to Aristides, whom he took for some ordinary person, and giving him his shell, desired him to write Aristides upon it. The good man, surprised at the adventure, asked him "Whether Aristides had ever injured him?" "No," said he; "nor do I even know him; but it vexes me to hear him constantly praised, and every where called *the Just*." Aristides made no answer, but took the shell; and having written his own name upon it, returned it to the man. Thus was the man rewarded who was the deliverer of Athens, and had by uprightness and justice so greatly contributed to its happiness. When he quitted Athens, he lifted up his hands towards heaven, and, agreeably to his character, made a prayer different from that of Achilles,

shells, and in general on the fragments of broken pots.

The most ancient monuments of Chinese knowledge were engraved on hard and large stones. The ten commandments were written on stone or marble plates; which seems more likely than as is supposed by some fanciful writers, who, to dignify those tables, hold out, that they were made of precious stones, rubies, carbuncles, or amethysts; but as nothing of this appears in the sacred original, it is more probable that they were of such stones

Achilles, namely, "That the people of Athens might never see the day which should force them to remember Aristides." Three years after, the Athenians reversed this decree, and by a public ordinance recalled all the exiles. The principal inducement was their fear of Aristides; for they were apprehensive that he might join the enemy, corrupt great part of the citizens, and draw them over to the interest of the enemy. But they little knew the worthy man; for, before this ordinance of theirs, he had been exciting and encouraging the Greeks to defend their liberty.

stones as were found at the spot, which might be most likely marble, being abundant in Egypt, and which were hewn, and polished, by the hand, or direction of Moses. Joshua wrote the other laws on plates of the same kind, and the names of the twelve Jewish tribes were carved on precious stones on the ephod of the high priest. The inscriptions on Mount Sinai, and the surrounding mountains, ought to be noticed here, if their antiquity could be ascertained. The hieroglyphics of the Egyptians, who boasted to be the most ancient of all nations, are chiefly found on obelisks, stone pillars, &c. and the decrees of Lycurgus were carved in stone. A very ancient Grecian superscription on stone is existing on the west borders of Asia Minor, where the Mitylenians have built the city of Sigium, from the gathered stones of the city of Troy. This city was destroyed long ago by the Iliensians; the stone still lies in the village of Ieni-

Ieni-Hiffary, called, by the Turks, Gaurkioi, before the porch of the Greek church, and is used for a seat. The inscription on this stone is now upwards of 2360 years old. William Sherard, Esq. British Consul at Smyrna, took the first copy of it; and Samuel Lisle, preacher to the English residing at Smyrna, copied it carefully, and it was afterwards engraved and printed in London, on nine sheets, by his Majesty's chaplain, Edmund Chishull, with explanations, in the year 1721. Still more ancient inscriptions at Amyclae, have been discovered, and published by Fourmont and Barthemely. They are written in the same manner as those of Sigeum, resembling plough-furrows, but they go from the right to the left, and were preserved in the Royal Cabinet, at Paris. Numerous other ancient inscriptions on stone are found commemorated in Carsten Niebuhr's Travels in Arabia. The convention of the Smyrnans and Magnesians was
engraved

engraved on marble 270 years before the birth of Christ, and the *Jus Publicum* of the Athenians was engraved on triangular stones named Cyrbes. Numerous old inscriptions in the Etruscan, Greek, and Latin languages, on stone and marble, on plates, urns, vases, and sarcophagi, are still preserved in the first and seventh room of the gallery of the Grand Duke of Tuscany at Florence; and in the first room of that gallery are several inscriptions on burnt clay, with which the Etruscans covered the unburnt bodies of their deceased friends. The Latin incriptions are divided into twelve classes. The first thereof commences with the gods, and their priests. In each of them are preserved some of those which have been brought from Africa by Pagni, described by Gori, Falconieri, and Spon; they are distinguished by the Greek α which is used in the place of the Latin I. The second class relates to the Emperors, and contains amongst others the so much
 admired

admired bafes by Maffei, and a large epiftylum which is faftened in the wall above the principal door. It was found with four others at Civita Vecchia in a dark repository belonging to monuments facred to Tiberius and Livia. It is worth the notice of antiquarians, that on this marble after the name of Tiberius fome of the infcription has been erafed, and replaced with the words *DIVAE AUGUSTAE*, which may be occafioned by Claudius's adoration of Livia. The third clafs refers to the confuls and other Romans of rank. The fourth, to the Roman municipalities, to which have been added a great many, new and beautiful. The fifth, for the publick buildings and plays in which the mile-pillars are included. The fixth, for the military. The feventh, and eighth, contain the titles given by furviving relations to their deceased ancestors. The ninth, relates to flaves who got their freedom. The tenth contains monuments of christianity.

The

The eleventh, such inscriptions of only the names of deceased persons. And the twelfth is a mixture of different inscriptions, amongst whom many are doubtful and seem to be counterfeited. But Maffei in his *Arte critica lapidaria*, recommends notwithstanding the preservation of these inscriptions, because they may serve for publick information, and principally, that at one time or the other it may be proved, they are genuine, as has been the case with the inscription of Scipio Barbatus, and several others in the collection of Riccardi, which were declared by Maffei, to be counterfeit. But notwithstanding several of them have been proved to be counterfeit, by the colour of the marble, the most part are genuine, which satisfactorily proves the art of writing was known to the ancients.

But these materials were soon found to be difficult to write upon, and therefore others, more simple and more convenient, were

were sought for. Bricks and stones were changed for different kinds of metals, and lead became then the most ancient writing substance. Job mentions, in chapter xix. verse 24, engravings with an iron pen on lead; and Pausanias says, that Hesiod's *Opera et Dies* was written on leaden tables, which were preserved on the mountain of Helicon. Pliny states, that lead was used for writing, which was rolled up like a cylinder. Hirtius wrote to Decius Brutus on leaden tables. In Italy were preserved two documents of Pope Leo III. and Luitbrand, King of the Longobards; and, according to Kircher's Museum, table X. many more of such writings on lead are to be found. For example, Montfaucon notices a very ancient book of eight leaden leaves, the first and last was used as a cover, and that it contains numerous mysterious figures of the Basilidians, and words partly Greek, and partly of Etruscan letters. On the back were rings fastened, by

means of a small leaden rod, to keep them together. Pausanias notices likewise, in his *Messenica*, that Epiteles dug up out of the earth a brass vessel, or urn, which he carried to Epaminondas; (about 350 or 360 years before the birth of Christ,) in which there was a fine plate of lead or tin, rolled up in the form of a book, on which were written the rites and ceremonies of the great goddesses. And we have a late discovery of writing on lead, if the account given in the *Gentleman's Magazine*, July 1757, may be depended on; it is no longer ago than in the year 304. "In a stone chest, the acts of the council of Illiberis, held anno 304, were found at Granada in Spain; they are written or engraved on plates of lead, in Gothic characters, and are now translating into Spanish."

Bronze was afterwards more frequently used than lead, as is certified in the History

tory of the Maccabees, by Dionysius of Halicarnassus, Cicero, Livy, Pliny, Suetonius, and Julius Obsequens. Phœnician letters were on the kettle of bronze, devoted by Cadmus to Minerva, who was adored at Lindus, on the island of Rhodes. But, as the kettle is not only lost, and the copies of the inscription, with those of Cadmian letters, on several tripod vessels, mentioned by Herodotus, and others, I shall confine myself to those which still exist, of which the most remarkable are the famous *Scriptum de Bacchanalibus*, in the Imperial Library; Trajan's *Tabula Alimentaria*; and the helmet, found at Cannae, with Punic letters, described in the *Museo Etrusco* of Gori, and which is now in the third room of the gallery of the Grand Duke of Tuscany, at Florence. I cannot omit noticing the eight tables of bronze, found in the town of Gubbio, in a subterraneous cabinet, when, in the year 1444, parts of an amphitheatre were removed: on seven tables the

inscriptions were in the Latin, and one in the Etruscan language. Since that time several bronze tables, with Etruscan writing, have been dug up in Tuscany. The seven Latin have been described and engraved on copper-plates, by Merula, Gruter, and others, and one by Thomas Demster.

The criminal, civil, and ceremonial laws of the Greeks have been engraved on bronze tables, and the speech of Claudius, engraved on plates of bronze, are yet preserved at the town-hall of Lyons, in France.

The celebrated statutes or laws on twelve tables, the major part of which the Romans copied from the Grecian code, were first written on tables of oak, but according to others on ten ivory tables, and hung up *pro rostris*. But, after they had been approved by the people, they were engraved in bronze. But these were melted through fire occasioned by lightning which struck

struck the capitolium, and consumed likewise numerous other laws for the cities and country, which were there deposited; the loss thereof was highly regretted by the Emperor Octavius Augustus. The laws of the Cretans were likewise engraved in bronze; and the Romans etched, in general, their code *plebiscita*, contracts, conventions, and public records, in brass, not only during the existence of the republic; but likewise under the reign of the Emperors. The magistrates of Athens were chosen by lot; the names of the candidates were written on bronze plates, and put into an urn, with white and black beans, and the person whose name was taken out with a white bean was elected.

The pacts between the Romans, Spartans, and the Jews, were written on brass, which method was likewise observed by the guilds and private persons who usually, for security, got the land-marks of their estates

engraved on metal; and in many cabinets are yet to be seen the discharges of soldiers written on copper-plates. It is not long since, at Mongheer, in Bengal, a copper-plate was dug up, on which characters of Schanfcreet were etched signifying a gift of land, from Bideram Gunt Raja of Bengal, to one of his subjects. This bill of feoffment, on copper, is dated 100 years before the birth of Christ, and proves at the same time that the Indians were, about two thousand years ago, in a high degree of cultivation. Such genuine documents, written on such hard substances, in more modern times are very scarce. The Archbishop Adelbert, of Mentz, ordered a grant to be engraved on metal plates, which privilege is kept over the door-wings of the church *B. Mariæ Virginis ad gradus*, in Mentz; and, in 1011, these door-wings were manufactured of cast metal, resembling bronze, by the Archbishop Willigis.

The Abbot Cabent, and the Benedictine Monk Legipont, entertain the opinion, that the most ancient writing material which has been used was wood. It is certain that box-wood, deals, and ivory tables, have in those times been occasionally made use of to write upon, but of the precise time nothing can be ascertained with certainty.

Isaiah (chapter xxx. verse 8), and Habakkuk (chapter ii. verse 2), make mention of writings upon tables, that it may be remembered for the time to come, for ever and ever.* Solon's Civil Laws were written on boards, which were placed in a machine,

* Solomon, in the Book of Proverbs, (chap. iii. ver. 3.) in allusion to this way of writing on thin slices of wood, advises his son, to *write his precepts upon the table of his heart*. Solomon lived about one thousand years before the birth of Christ, and Habakkuk near four hundred years later; between which two different periods, different authors place the birth of Homer. This proves, that the *pugillares*, or tables of wood to write on, were in use before Homer's time, but how long before, no authentic account can be obtained.

a machine, constructed to turn them easily, called *axones*; and, even in the fourth century, the laws of the Emperors were published on wooden tables, painted with ceruse, which gave rise to the expression in Horace: *Leges incidere ligno*. The Swedes had the same custom, for which reason the laws are still by them named, *Balkar*, originating from a piece of timber, called *Balkan*, which is a balk or beam.

The Greeks and Romans used commonly, at an early period, either plain wooden boards or covered with wax. The Greeks called wooden boards which were not covered with wax, *Schedæ* or *Schedulæ*. On such *Schedulas* was written, in the Hebrew language, the Gospel of Matthew, which, according to Baronius, in his *Martyrologium Romanum*, was found in the tomb of the Apostle Barnabas. The name of *pugillares* given by the ancient Romans, originates from *pugillum*, because they
could

could be held in one hand; these tablets also were sometimes called *codices* and *codicilli*; from *caudes*, the trunk of a tree, being cut into thin slices, and finely planed, and polished; and they usually consisted of two, three, five, and sometimes of more leaves; from whence they were more distinguishingly denominated by the Greeks *diptycha*, *triptycha*, and *pentaptycha*; and those leaves, being waxed over, or overlaid with wax, were named *Pugillaris cerei*, and were written upon, with an instrument called a *stile*. Yet it is very probable, that those tablets, being only thin slices of wood, having a smooth surface, were at first written upon just as they were planed; and that the overlaying them with wax, was an improvement of that invention. Persons who would privately correspond, or give secret intelligence to others, wrote it on plain wooden boards, on which they laid wax after they had written on the wood. Pliny assures us, that the writing on wooden boards

boards was a custom even before the Trojan war. Such boards have been sometimes simply named *Cera*, from which originate the description *Cera prima*, *Cera secunda*, *Cera tertia*, &c. which signifies the first second, and third page. The ancient Jurists unite often the words *Tabulæ* and *Cerae*. It appears notwithstanding, that they describe under the denomination of *Tabulis*, a carefully written work, and under that of *Ceris* and *Pugillaribus*, they comprehend a careless written manuscript, or copy of writing. Numerous testaments have been made on *Tabulas ceratas*. But I recommend attention to the stated boards or tables, to prevent misrepresentation; because, under the general description of *Tabulæ*, is often understood not only wooden boards, but also stone, ivory, and metal tables and plates.

The Romans employed for common use, and principally for writing letters, small
boards

boards of common wood, overlaid with bees wax, which were sealed in linen clothes; and, if the last will was written upon these boards, they were run through, and joined together with lace or tape. They used likewise very thin levelled boards, of soft wood, named, according to Martial, *Tenuis tabellas*, which were not overlaid with wax, but in which the letters were carved.

In the archives of the town-hall in Hanover, are kept twelve wooden boards, overlaid with bees wax, on which are written the male and female names of owners of houses, and of houses without noticing the streets; but, as Hanover was divided, in 1428, into streets, we have reason to believe, that these wooden manuscripts are more ancient. These boards are apparently of beech wood, and have on the four corners an elevation, and the places within are filled up with green wax.

wax. The first and last table serve, at the same time, as a cover, and are, therefore, only on one side overlaid with wax, but the others on both sides. These twelve boards form therefore only twenty-two pages; the outside boards are joined by a piece of leather pasted on them, to form the back of the book, and the leather is fastened, by nails, to the other ten boards. This curious manuscript book is one foot five inches high, eight and an half inches wide, and about five and an half inches thick, or each leaf about half an inch. There is, besides the before-mentioned elevation on the four corners, another cross elevation, which divides every sheet into four square columns: on each page are between sixty and seventy lines of Monkish letters, which are apparently pressed in the wax with a fescue. Seven pages are in good preservation. Another manuscript, much like this, is in the gallery at Florence, in the third room in the eleventh scrine; another

another in the city library of Geneva; and several are still existing in other libraries and archives, of which I only will notice the wooden Runen-almanack; and the waxed boards which are, according to Lewis of Straßbourgh, still preserved in the church of the Salines at Halle.

The rich Romans used, instead of wooden boards overlaid with bees wax, thin pieces of ivory, named *libri eborei*, or *libri elephantini*; and Ulpian states, that the principal transactions of great princes have been usually written with a black colour on ivory. Flavius Vopiscus says, that there was a book of ivory in the library of Ulpian. The existence of ivory books has been fully ascertained by Martial, Salmassius, and Schwarz, notwithstanding other authors have held out, that the name of *libri elephantini* originates from the enormous size of these books, or from the intestines of elephants, on which they have

have been written; but this is certain, that only the great and the rich were able to use ivory tables, because they were scarce and dear.

It must be observed, that these wooden tables overlaid with wax were of different sizes; and, according to Quintilian, likewise used to teach writing to beginners; and, according to Cicero, it seems that the critics were accustomed by reading wax manuscripts to notice obscure or wrong phrases, by joining a piece of red wax. The Greeks and Romans continued still to make use of such boards, even at the time when writing on leaves of trees, on Egyptian Paper, on membranous substances, and on parchment, was already adopted, because they could thereupon put down their fugitive ideas, and change or correct them easily, before they wrote on other substances; and it has been proved, that even when linen Paper was first discovered,

such

such boards have been sometimes made use of. The Chinese have, in very ancient times, likewise written with large iron tools on boards, pieces of bamboo, and occasionally on metal.

Curious researchers are recommended to consult Perizonius's instructive notes upon the 12th chapter of the 14th book of Aelian's Various History, where we are informed also, that these wooden table-books were often made of the linden or lime-tree, as well as of box, to which the maple may be likewise added, which, being capable of an elegant polish, was used for the same purpose. Thus Ovid says,

———— *Veneri fidas sibi Naso Tabellas
Dedicat, at nuper vile fuistis Acer.*

———— This trusty table-book,
To thee, O Venus, now I dedicate,
Which was but worthless maple-wood of late.

But

But box was nevertheless commonly used, and we may judge of the ornaments of those wooden books from the following distich in Propertius.

*Non *illas fixum caras effecerat aurum,
Vulgari buxo sordida cera fuit.*

With gold my tablets were not costly made,
On common box the sordid wax was laid.

The use of boards was superseded by the use of the leaves of palm, olive, poplar, and other trees. According to Pliny, the Egyptians were the first who wrote on palm leaves, for which reason their letters obtained the name of Phoenixian letters, because the Greeks called the palm-tree *Phœnix*. In the library of the city of Strahlsund is a book still to be seen, written on palm leaves. The Malabars yet write on leaves of the palm, *Corypha umbra culifera*, and form the letters with a fescue at least twelve inches long, and anoint the
leaves

leaves afterwards with oil. The written letters are rolled up. Their books are of many such leaves, which are joined together with a tape, and framed between two thin boards of the same size. There are Bibles still preserved, written on such leaves; one of them, the Telugian or Warugian Bible, is to be seen in the library of the university of Gottingen, containing 5376 leaves, formed into forty-five sheets, which has been purchased from Baumgarten, in a public sale; another is at Copenhagen; and one in the Orphan's house, at Halle; which are all the copies of this scarce work to be found in Europe; but that preserved at Halle is, according to Dreyhaupt, not written in the Telugian, but in the Damulian language. The explanation of twelve large volumes, with plants of Malabar, to be seen in the Academical Museum at Gottingen, is mostly drawn with a fescue on palm leaves. In Hesselberg's library, at Copenhagen, was a

part of the New Testament, written in the Malabar language, on palm leaves. The Bramin manuscript, in the Kulingiennian language, which was sent from Fort St. George to Oxford, is of Malabar palm leaves; and Mr. Asple states, in his *Origin and Progress of Writing*, (chapter iv. page 49,) that in Sir Hans Sloane's library were more than twenty manuscripts of palm leaves, written in different Asiatic languages; and he says, (chapter viii. page 203,) that he himself is in possession of a manuscript, written on palm leaves, in the Peguan language, which is twenty-one inches long, and three inches and an half wide; the ground of which is richly ornamented with gold, and the letters are inlaid with a black gummy-like substance.

Knox states, in his *History of Ceylon*, that there grows a kind of palm tree, of which the leaves are woolly, and of considerable breadth, named the pananga tree, which

which are used by the inhabitants for writing, after having taken off the outer skin. They use talipot-tree leaves for the same purpose.

Pliny, who was a diligent enquirer into antiquity, says, speaking particularly of the Egyptians, that they wrote upon the leaves of palm trees; or, according to the various reading of *malvarum* for *palmarum*, upon the leaves of mallows. But it is probable, the ancients wrote upon any leaves that they could make fit for that purpose. Hoffman, in his Lexicon, under the word *palma*, states, from Petrus de la Valle, that the Indian Brachmans write upon the leaves of palm trees, and that one of them made him a present of a book composed of these leaves. It was likewise the custom of the Sibyls of old to write their prophecies upon leaves, as appears by the following lines in Virgil, (*Æneid*, lib. iii. v. 443.)

A raging prophets you there shall see,
 Who from her cave sings what the fates decree;
 Her mystic numbers writes on leaves, and then
 In order lays, and lurks within her den;
 Before the door they lie, as they were plac'd,
 But if that opening, or some sudden blast
 Should them disorder, she no more will sing,
 Nor when once scatter'd, to contexture bring.

This usage of the Sibyls writing upon leaves was so current, that it became proverbial among the Romans to use *folium Sibyllae* for any undoubted truth. Thus Juvenal says,

Credite me vobis folium recitare Sibyllae,

Believe me, what I here declare to you,
 Is truth itself; no Sibyls leaf more true.

The sentence of banishment or *pedalism* (*petalismus*) of the Syracusans, according to Diodorus Siculus, was written on olive-tree leaves; and on the same kind of leaves were written the names of those who were excluded from the Senate of Athens, which punishment was called *Ekphyllophoresis*.

The

The East Indians have, and still use, in some parts, leaves for writing. And, according to Helvetius Cinna, poplar-tree leaves have been likewise used.

The inhabitants of the Maldivia islands write on leaves of the macarcquo tree, which are three fathoms long, and one foot wide; and sometimes on thin wooden boards after they have been painted white. In many places in the East Indies, the leaves of the musa or banana tree were used for writing, till the Europeans introduced paper; and in the island of Java they still write on the leaves of the lantor tree, which are very smooth, and five or six feet long. Several other eastern nations use, for that purpose, the leaves of the cocoa tree, the taon-condar tree, and of a tree named, by the Malays, olen, which grows every where plentifully in that country, and is a kind of wild palm tree, the leaves of which are about one yard and

an half long, and three inches wide; for extensive writings they are tied together. The letters are written thereon with an iron tool, which pierces the outside covering, and makes indelible letters, which method is preferred by the Indians, because they are ruled by the touch and not by the eye: those leaves have a quality which makes them preferable to our paper; they are not only very strong, but, if they remain even for a long time in water, they are not liable to rot or grow tender, and the writing is not destroyed, for which reason the natives continued to use them, notwithstanding many paper-mills have been erected in India. It is remarkable, that poplar-tree leaves were principally used for sacred writings, which may be the reason why Pythagoras calls the leaf of the poplar-tree, a sacred leaf.

The custom of writing on leaves of trees was superseded by the use of the raw bark
of

of trees, and the interior bark of the lime tree, of which Suidas remarks, that it resembles *Papyrus*; and also the bark of elder, elm, and birch tree. The exterior bark (*cortex*) was seldom used, being too coarse in general, and not sufficiently smooth to write on legibly and easily. The interior bark (*liber*) was therefore preferred, being smooth and fine. From this originates the Latin name for a book. To carry those barks commodiously in the pocket, they were rolled up, and called *volumen*; which name has been continued for rolls of paper and parchment, and for books, notwithstanding our books have a very different shape. The name *codex*, or more properly *caudex*, still in use, originates in a like manner: and notwithstanding its true meaning is the trunk of a tree, it was adopted to describe many sheets of the said bark-shavings together.

The shape of the bark-shavings on which

the ancient Europeans wrote was not all of the same size, and those manuscripts are very scarce. Montfaucon says that there are none in Italy; and that he found only one in the archives of the city of St. Denis, in France. Cragus saw in the city of Chur, in Switzerland, some verses of Virgil written on the interior bark of the birch tree. It is stated in *Acta Petropolitana*, tom x. page 449, that many whole books of this kind have been found in Siberia, the letters of which were in the language of the Calmuks. The ancient favorite song: *Eija mit hierta ratt innerlig*, &c. was called the Birch song, because Elfa, the daughter of Andres, had originally written it on the bark of a birch tree. The protocols of the Emperors were in these times written on the same writing-material to prevent falsifying, because, if the surface was shaved in the smallest degree, the letters were destroyed, and could not be replaced by others. Several nations use it still for writing,

writing, notwithstanding paper is well known to them. Mr. von Justi asserts that he possesses a letter written, in the Malabar language, on the bark of a tree; and the Orphan-house at Halle, in Germany, possesses likewise a large manuscript with Bomanian letters. In Sir Hans Sloane's library, was a manuscript written in PATTANIAN characters; and a letter of a Nabob, two yards long, richly ornamented with gold. In the British Museum are several pieces of the exterior and interior bark of trees, written on; and many more are in other British libraries. In the gallery of the Grand Duke of Tuscany, at Florence, in the third apartment and the eleventh partition, are several writings on bark, but not ancient: but of the antiquity of a very great number of the like manuscripts in the Vatican library, in Greek, Hebrew, Arabic, and Latin, there is not the least doubt.

To this succeeded the method of painting the letters with pencils, on linen and cotton:—whether these cloths were of the same kind as those now in use, cannot be ascertained. According to Symmachius, a great many of the prophecies of the Sybils were likewise written on linen cloth. And Livy states the same, of the annual registers of the Romans. But Pliny says, linen was only used for writing in private affairs, notwithstanding, Livy and Claudian, and the Theodosian Codex have proved the contrary; and in the latter (tit. xxvii. cap. 11.) is principally noticed a law, written on *mappas linteas*. The Chinese wrote two thousand years ago, in the reign of Tsin, before they invented the art of making paper, on pieces of linen or silk, cut to such a size as they wished to have the book. But it was not usual for the Greeks to write on linen. Count Caylus remarks, that there were found, sometimes in the boxes containing Egyptian mummies, very neat characters

characters, written on linen. It seems natural, that all linen, used for writing, must have been steeped in size or gum, or the ink and paint must have blotted.

Of the inhabitants of Partha, it is said that they wrote upon the same stuff of which they made clothes. And some Indians write yet on a kind of cloth, named *Syndon*.

But, as linen was too much subject to become mouldy, animals were then attacked, to furnish stuff for a writing material:—their skins (*coria*) were principally used to write upon, after they had been tanned on both sides: those of sheep, goats, and asses were preferred. Several books, written on these, were in the Vatican library; in that of the King of France; and in several others. In the convent of the Dominican monks at Bologna, are two books of Esdras, written on asses skins, which are

are said to be the original manuscripts of Efdras himself: but it is certain that it has been written only about five hundred years ago, and it looks like leather. This copy was given to the Prior Aymerico, of that convent, by a Jew, in the commencement of the fourteenth century, who by this bribe endeavoured to secure his fellow Jews against the Inquisition, and therefore to make it the more precious and valuable assured the Prior it was the genuine hand-writing of Ezra.

The ancient Persians and Ionians wrote on hides from which the hair was scraped. And the shepherds in former times wrote their songs with thorns and awls on straps of leather, which they wound round their crooks.

The Icelanders scratched their *runes*, a kind of figurative writing, or hieroglyphic, sometimes on walls: and it is noticed in
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the *Laxdaela Saga*, that Olof, at Hiardarhult, has built a large house, on the balks and spars of which he has got engraved the history of his own and more ancient times; and Thorkil Hake wrote his own deeds, in those hieroglyphics, on his chair and bed. The most ancient *runes* are traced to the third century; and the most ancient historian, who mentioned them, is Venantius Fortunatus, who lived in the sixth century.* Of these letters, or hieroglyphics, there were no more than sixteen in the whole; but as, in the year one thousand, the Christian faith was introduced into Iceland, they were found insufficient, and Latin letters were adopted.

Puricelli maintains, that the Italian Kings, Hugo and Lotharis, had given a grant to the Ambrosian church, at Milan, written on the skin of a fish, which

Muratori

* He says in *Carm.* vii. 18, *Barbara fraxineis pingatur Runa tabellis.*

Muratori took for a kind of parchment by the want of sufficient investigation.

Not only the skins of animals were used for a writing substance, but also bones and entrails, if they were thought to be fit for that purpose. In the history of Mahomet, is slightly noticed, that the Arabians took the shoulder-bones of sheep, on which they carved remarkable events with a knife; and, after tying them with a string, they hung their chronicle up in their cabinets.

In the library of the Egyptian King Ptolomæus Philadelphus, which is said to have contained 700,000 volumes, were the works of Homer, written in golden letters on the skins of serpents and other animals; and under the reign of the Emperor Basiliskus, was burned, at Constantinople, a manuscript one hundred and twenty feet long, written on the intestines of beasts, &c.

in golden letters, containing Homer's Iliad and Odyssey. In the library of the Emperor Zeno Isauricus were likewise Homer's works, painted in golden letters on the entrails of animals: and we know, from Isidorus, that the intestines of elephants have been also used for writing.

But these writing-materials were neither common writing-masses nor in general use, and regarded rather as a rarity. There is in his Majesty's library at Hanover a letter engraved on a golden plate, written by an independant prince of the coast of Coromandel to King George the Second which is about three feet long and four inches wide, and inlaid on both of the narrow sides with diamonds, which was delivered to the late Mr. Scheidt, to be there kept.

We arrive now at the period when the Egyptian Paper was invented, and manufactured from the rind of the Paper-plant,

Papyrus,

Papyrus,* which grows in the marshes on the borders of the Nile, and is called in the Egyptian language *Berd*, or *al Berdi*. Theophrastus, Pliny, Guilandin, Prosper Alpin, and other authors, describe the
Egyptian

* The Egyptians call it *Berd*, and they eat that part of the plant which is near the roots. The internal part of the bark of this plant was made into paper; and the manner of the manufacture was as follows: Strips, or leaves of every length that could be obtained, being laid upon a table, other strips were placed across, and pasted to them by the means of water and a press, so that this paper was a texture of several strips; and it even appears that, in the time of the Emperor Claudius, the Romans made paper of three lays. Pliny also says, that the leaves of the *Papyrus* were suffered to dry in the sun, and afterwards distributed according to their different qualities fit for different kind of paper; scarce more than twenty strips could be separated from each stalk. This paper never exceeded thirteen fingers breadth. In order to be deemed perfect, it was to be thin, compact, white, and smooth. It was sleeked with a tooth, and this kept it from soaking the ink; and made it glisten. It received an agglutination, which was prepared with flour of wheat, diluted with boiling water, on which were thrown some drops of vinegar; or with crumbs of leavened bread, diluted with boiling water, and passed through a bolting cloth. Being afterwards beaten with a hammer, it was sized a second time, put to the press, and extended with the hammer.

Egyptian Paper-reed to be a plant of the rush kind, which grows in swamps about ten cubits long. The stalk is triangular, and of a thickness to be spanned; its root crooked; furrounded, near the root, with short leaves, but naked on the stalk. This stalk has on the top a bush, which resembles in some respects a head with hairs, or of long, thin, straight fibres; the root is brown. After Pliny, Guilandin furnishes us with the best description of the *Papyrus*, and the method how it is prepared for the use of writing; all other subsequent authors have, more or less, copied them.

The Egyptian Paper-reed which according to Strabo grows only in Egypt and India, and of which in the year seventy-nine, after the birth of Christ, a species was found in the Euphrates near Babylon, which was equal in quality to the genuine Egyptian *Papyrus* for making Paper, must not be mistaken, as Ray and others did, for
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the Papero-plant growing in Sicily, which much resembles the other. Lobel has given a description of the Sicilian Papero, in his *Adversariis*, and it does not seem that it has been used in ancient time for making Paper: it is only lately that the Chevalier Savario Landolina has sent samples of Paper to the society at Gottingen, manufactured from this plant, according to the description which Pliny has given of the manufacture of *Papyrus*.

Many authors believe that the Egyptian Paper-plant is no more existing, which does not seem likely, because it was a plant in many respects of the rush kind; but by the changes which the soil in that country has experienced, it may have become scarcer. Nevertheless, it is not noticed by Pocock; and Shaw notices it only amongst the hieroglyphics of the ancient Egyptians. Maillet observes (which seems to be improbable), *Je serais cependant assez porté*

porté à croire, que ce n'est autre chose que la plante appelée au Caire figuier d'Adam, et par les Arabes Mons. Most of the modern geographers, who describe Egypt, take no notice of this plant, which may lead us to believe that they have either no knowledge thereof, or thought it no object of consequence; but not that it exists no longer: and, as Pliny states that *Papyrus* was not only used for making Paper, but for numerous other purposes, which he describes, we must presume that care would have been taken to preserve such an useful plant.

The Egyptian Paper was manufactured from the fine pellicles of the *Papyrus* which surrounded the trunk (the finest of which were in the middle), and not from the marrow of the plant. These pellicles were separated by means of a pin, or pointed muscle-shells, and spread on a table sprinkled with Nile water, in such a form

as the size of the sheets required, and washed over with hot glue-like Nile-water. On the first layer of these skins, a second was laid cross-wise to finish the sheet, (*Plagula*) which was pressed, hung up to dry, and smoothed and polished with a tooth. The Nile-water was laid on with great care, to prevent spots in the Paper. Twenty skins were the utmost which could be separated from one stalk, and those nearest to the pith made the finest Paper.

Twenty sheets, glued together, were called *scapus*, but sometimes several *scapi* were glued together, to form a large *volumen*. This part of the business was executed by the *Glutinatoris*, the work of whom resembles in many respects that of the book-binders in our time. All persons who worked in these Paper-manufactures had names according to their work.

With respect to the time when this
Paper

Paper was invented there are different opinions; and even the name of the inventor is unknown. Some authors have tried to prove its antiquity from Homer, Hesiod, and Herodotus, and conjectured that Moses had written his books on Egyptian Paper, whereas Varro states that the invention was not known in the time of Alexander the Great, which is about four hundred years before the birth of Christ; but as Aristotle mentions the book-moths as well-known insects, it seems likely that the invention is more ancient; and Pliny refutes Varro, by quoting Cassius Hemina, who states that a writer named Terentius, by digging a piece of land on mount Janiculum, found in a stone box the books of Numa, written on Egyptian Paper, which was completely preserved, notwithstanding it had been 350 years buried in the earth, because it had been steeped in oil of cedar; and that Mucian, who was three times consul, had assured him, that during the

time he was commander-in-chief in Lycia, he had seen there, in a temple, a letter of the Lycian King, Sarpedon, written on Egyptian Paper. It is true Guilandin has proved that the Paper-reed was known long before the reign of Alexander the Great, which he states was used for several purposes, but thereby cannot be positively ascertained that it was used as Paper-stuff.

Nevertheless, it is remarked by Varro, that soon after the time that Alexander built Alexandria in Egypt, the making paper of the *Papyrus* for writing on, was first found out in that country. On the invention of which, all the other ways of writing were in a great degree* superseded;

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*This must be understood, with some restriction; for wooden table-books continued in use for ages after. The father of John the Baptist, did not ask for pen, ink, and paper, but a writing-table, to write his name in. Nay, they were common so late as the fourth century, as appears from the story of Cassianus, told by Prudentius

no materials till then invented being more convenient to write upon than this. Therefore when Ptolemy Philadelphus, King of Egypt, began to make a great library, and to collect all sorts of books, he caused them to be all copied on this new invented paper. And it was exported also for the use of other countries, till Eumenes, King of Pergamus, endeavouring to form a library at Pergamus, which should

Prudentius as follows: Cassianus was the first Bishop of Siben in Germany, where he built a church in the year 350. But being banished from thence by the infidels, he fled to Rome; and was afterwards obliged to keep a publick School for a living at *Forum Corneli*, now called *Imola*, an episcopal city in Italy. But in 365, he was taken by order of Julian the Apostate, and exposed to the incensed cruelty of his scholars, who killed him with their *pugillares*, having first tortured him with great cruelty with the same *styles*, with which he had taught them to write. From hence it appears, that some of those table-books, especially such as scholars learned to write in, were pretty large and heavy. Which is also confirmed by some lines in Plautus, where he says, that a boy of seven years old, broke his masters head, with his table-book,

should outdo, that at Alexandria, occasioned a prohibition to be put upon the exportation of that commodity; for Ptolemy, to put a stop to Eumenes's emulation in this particular, forbid the carrying any more paper out of Egypt. This put Eumenes upon the invention of making paper of Parchment, and on them he thenceforth got copied such of the works of learned men, as he afterwards placed in his library; and hence parchment is called *pergamena* in Latin, from the City Pergamus, in Lesser-Asia, where it was first used for this purpose amongst the Greeks. But that Eumenes, on this occasion, first invented the art of making parchment, is dubious; for in Isaiah viii. 1. Jeremiah xxxvi. 2. Ezekiel ii. 9. and other parts of the Scriptures, we find mention made of rolls of writing; and might not those rolls be of parchment? And it is said by Diodorus Siculus, that the ancient Persians wrote all their records on skins; and Herodotus

Herodotus tells us of sheep-skins and goat-skins having been made use of in writing by the ancient Iönians many hundred years before Eumenes's time. It seems therefore possible, that Eumenes found out a better way of dressing them for this use at Pergamus, and perhaps it thenceforth became the chief trade of the place; and either of these is reason enough from *pergamenus* to call them *pergamænæ*. There is indeed in our English translation of Isaiah's prophecy concerning Egypt, mention made of paper reeds by the brooks, (chap. xix. 7.) which prophecy was delivered four hundred years at least before the time that Varro places the Egyptian invention; by this one would imagine that paper made of those reeds was in use when that prophecy was written;* for
 why

* The learned Dr. Gill is of that opinion; for in his commentary upon the aforesaid verse in Isaiah, he says, "On the banks of the Nile grew a reed or rush, called by the Greeks *papyrus* and *byblus*, from whence come the
 the

why were they called paper-reeds, if not applied for that purpose? But little stress can be laid upon this passage, because the learned are not agreed about the meaning of the original Hebrew word, which is there translated paper-reeds. However, let it be the *papyrus*, or let it be *parchment*, that was first found out to write upon, it is certain that the use of parchment has long out-lasting that of the papyrus; for books made of this material are now great curiosities. Eustathius, in his comment upon the twenty-first book of Homer's *Odyssey*, remarks that it was disused in his time, which is near six hundred years ago.

The Paper manufactured in Egypt was rather of an inferior quality, and the Romans prepared

the word *paper*, and *bible* or book, of which paper was anciently made, even as early as the time of Isaiah, and so many hundred years before the time of Alexander the Great, to which time some fix the æra of making it.

prepared it more carefully, and paid more attention to the washing, beating, glueing, sizing, and smoothing than the Egyptians. They sized it in a similar method as we do rag-paper, but they made their size of the finest flour, which was stirred in boiling water with a few drops of vinegar and some leaven, and then filtered. It was after the first size beat with a hammer; sized the second time, pressed, and then smoothed. This Paper of the Romans was very white, and according to Pliny, never more than thirteen inches wide.

Pliny and Isidorus have informed us that the Romans had several sorts of Paper, to which they had given different names. Pliny mentions eight of these.

1. *Charta Hieratica*, of which were four different sorts.

a. *Charta Hieratica*. This was a Paper not cleaned at all.

b. *Charta*

b. *Charta Augusta*, (so called to pay respect to the Emperor Augustus) was improved by one cleaning.

c. *Charta Liviana* (named after the Empress) which was rendered superior by a second cleaning.

d. *Charta Hieratica*. This name was likewise given to Paper in full perfection.

The Romans named these four assortments in general *Charta Hieratica*, or Holy Paper, because it was principally used for sacred books and writings. All were eleven inches wide.

The *Charta Augusta* had at first the preference, but being too thin for the writing-cane, in the fiftieth year after Christ, under the reign of the Emperor Claudius, it was improved by lining the Augustan
 Paper

Paper with an underlaying of the same Paper, which gave the name to

2. *Charta Claudia*. This Paper was better than *Charta Augusta*, and two inches wider. I must observe, that all books preserved in *Herculaneum* are written on Paper not underlaid; and that the first Paper was only written on one side. The *Adversaria*, of which Pliny the elder left one hundred and sixty volumes, were the only books preserved in which the leaves were written on both sides; two leaves being pasted together. It is said that Julius Cæsar was the first who wrote *opisthographically*, but only when he wrote letters to confidential friends.

3. *Charta Fannia*. *Palæmon*, a celebrated grammarian, had in the year five, several public work-shops, in which this Paper was prepared with more skill: it was usually used for writing plays upon. It was

was ten inches wide, and glazed with a tooth, ivory, or muscle-shells.

4. *Charta Amphitheatrica*, which was much coarser than the before-mentioned sorts, and only nine inches wide.

5. *Charta Saitica*, which was only made in the city of Said, Salo, or Sahid, from the cuttings or shavings, and refuse of other Paper, which was gathered throughout the country, and re-manufactured in this city: it was not full nine inches wide.

6. *Charta Tanitica*, which obtained that appellation from the city of Tanic, now Damietta.

7. *Charta Emporetica*, or shopkeeper's Paper, which was used to wrap goods in, was manufactured from the next pellicle under the rind of the Papyrus, and sold by weight: but, being only six inches wide,
it

it was found to be inconvenient for covering and packing of goods. It has been called by some *Leneotica*.

8. *Charta Macrocolla*, or only *Macrocol-lum*. It received its name from its large size.

Several authors mention other sorts: *Charta Libyana*, which was in quality next to the *Chartæ Augustæ*, *Charta Thebaica*, *Charta Carica*, *Charta Memphitica*, *Charta Corneliana*, after Cornelius Gallus, who was the first that had this paper manufactured. *Mellonis Pagina*; *Charta Blanca*; it obtained its name from its beautiful whiteness: this name is yet applied to a blank sheet of Paper, which is only signed. *Charta Nigra* was the name of Paper painted black, and the letters written thereupon were of white and other colours.

The Egyptian Paper was manufactured in
Alexandria

Alexandria and other Egyptian cities, in such large quantities, that Vopiscus speaks of Fermies having boasted, that he possessed so much Paper, that its value would maintain a large army for a long time. Alexandria was for a considerable time solely in possession of this manufacture, and acquired immense riches, which was much noticed by the Emperor Adrian; and it is not at all surprizing, that the gain which the inhabitants of Egypt made from the trade and consumption of this manufacture, during the space of several hundred years, was exceedingly great; having it all to themselves, and furnishing Europe and Asia therewith. At the end of the third century the commerce of Egyptian Paper was still flourishing, and continued to the fifth century, notwithstanding it was charged with a very high impost, which induced King Theodoric, a friend to justice, *after these imposts were,* at the latter end of the fifth century, *greatly increased,*

increased, to deliver Italy therefrom at the commencement of the sixth century. Casiodorus wrote on that subject a very remarkable letter (the thirty-eighth letter in his eleventh book) congratulating the whole world on the cessation of an impost on an article of commerce, so necessary for the convenience and improvement of mankind; and so highly oppressive to the cultivation and prosperity of arts, science, and commerce.

It was still used occasionally in Italy until the eleventh century, but not generally, by reason of its laborious, difficult, and expensive manufacture, and that the use of Parchment and Paper made of cotton became gradually introduced. Several authors differ again in stating the exact period when the use of Egyptian Paper was dropt; but this difference may originate from mistaking the Paper made of Papyrus for that of the bark of trees, which was even con-

tinued to be used in the twelfth century, and shall be mentioned hereafter.

Some of that Paper is preserved to the present time. It was already known in France in the fifth and sixth centuries. Mabillon quotes several acts still existing, written on Paper manufactured from the Papyrus, by the Kings Childebert the First and Clodovic the younger; and Gregorius Turonensis affirms in his letters, that it was generally used at an early period in the French Chancery. In the Abbey of St. Germain des Prez, at Paris, was a complete work written on Egyptian Paper. In the Royal Library at Paris was the *Charta plenariæ potestatis*, written on the same Paper. And Mabillon remarks that one of such manuscripts, written in the sixth century, was in the Library of Mr. Petau, which Montfaucon could not get a sight of.

In the Cottonian Library are four leaves
of

of this Paper, on which the gospels of St. Matthew and St. John are written.

Italy can produce several explanations of Psalms, manuscripts of the Fathers of the Church, Public Acts, &c. written on Egyptian Paper: amongst them I must notice a scarce relick of the treasury of St. Mark, at Venice, which is the gospel of St. Mark, written by himself, of which some leaves have been conveyed to Prague, by the Emperor Charles IV. It is kept with great veneration and care in a silver case gilt, which is in the form of a book, and considered to be the most precious piece of the whole treasury, notwithstanding no person is able to distinguish a single letter, being so much injured by time, that it tumbled to ashes when only touched. Zanetti discovered in the cabinet of Mr. Nani, a diploma of Papyrus, a Venetian ell long, and half an ell wide. And lately was found, in the archives at Florence, a document

which is apparently written between the years of 454 and 469, of six feet by two; many others are existing in Italy, too numerous to specify.

Amongst the several documents written on Egyptian Paper, at Vienna, is a diploma of Pope Benedict III, of twenty one feet by two: and a document in Latin, which is entirely preserved. The record of Ottokar, King of Bohemia, is likewise written on Egyptian Paper. In the Electoral Library at Munich, is a manuscript on reed; and in the Library at St. Gall in Switzerland, is a Codex of this Paper, on thirty leaves in quarto, written in the seventh century, with *Uncial* letters, containing the *Homilies St. Augustini et Isidori*. In the Library at Geneva are two manuscripts, according to Mabillon and Montfaucon, of the fourth and fifth century. I could quote many more remains of Egyptian Paper, noticed by Mabillon, Vacchieri, Gerken, Lambecius,

cius, and other authors; and other manuscripts lately discovered by scientific travellers; but, as it would extend this account beyond my intended limits, I shall now turn to another Paper-material, which is more ancient than the Paper of Papyrus.

Charta Corticea, or Paper of the Bark of Trees, manufactured of the *membrana ligni tenuiori*, and likewise used for writing, is difficult to be distinguished from the Egyptian shrub-paper, called *Charta papyracea ex pelliculis herbæ Ægyptiacæ*, and therefore often considered to be the same; and several authors deny it ever to have existed. But if they had carefully examined these two sorts, they would have discovered their error, and the difference.

The *Charta Corticea* has been, as afore-said, made of the fine skinny substance separated from the interior side of the bark

of such trees as were fit for that purpose, which has been most likely formed into Paper by washing, beating, and plaining, like the Paper of Papyrus. But it had always three or four couches, which were glued together, and was therefore through its thickness not only more brittle, but the united pellicles often separated; principally the upper couch which was written on, and the writing became, therefore indistinct and useless. The *Codices* of *Charta Corticea* are for the major part written in Latin, which gives us reason to suppose, that it was used principally in the western countries, where the Egyptian Paper could not be obtained, or was very expensive, and the inhabitants were therefore obliged to try to make their own paper. All ancient documents in Germany which are not written on parchment are in general on Paper made of silk, wool, and the bark of trees; but these on Paper made from Papyrus are scarce, and a much experienced
eye

eye is only able to distinguish one from the other. In the Abbey of St. Germain is a remnant of a manuscript, the upper couch of which has disappeared with the letters. In the archives of the church at Gironne are preserved the bulls of the Popes Romanus and Formosus, of the years 891 and 895. They are about six feet long, and three feet wide, and are apparently formed by gluing the skins or leaves couchwise one to the other; and the writing remains legible in different places. The learned men in France could not agree, on the substances, of which this paper had been made, and differed in their opinions; some take it to be Egyptian paper, and others for paper made of the inner fibres of the bark of trees, and the last opinion was supported by the majority, which induced the Abbot Herault de Belmont to write a treatise on those differences of opinion; and according to the genealogic almanack at Berlin,

of the year 1788, many remnants of this curious paper are yet preserved in several convents. In the Imperial Library at Vienna is likewise an original preserved, which is a *charte blanche*, granted on this kind of Paper. The use of this Paper continued in France till the 12th century.

That, in the most ancient times, skins and hides* of animals have been used as a writing material I have before stated. In more modern times the skin between the hide and the flesh was separated, scraped, and by working and rubbing with quicklime, were formed into leaves, and called *Membrana*. These were used by the Hebrews and Greeks; and the

Libro in corio, is not the particular name of books written on animal skins, but many times used for books of bark of trees; and, when Ulpianus speaks of *libris in corio*, corium signifies no animal skin, but the bark of some other trees than the lime-tree, which has been named *coria*.

the Jews maintain that their ancestors used them for writing on the Mountain of Sinai. It is certain that the Jews had at the time of David, books of the skin of animals rolled up called *Mgilloth*; and Herodotus assures us, that in remote times the skins of sheep and goats were the usual writing materials about 440 years before Christ. That the ancients have used skins of different animals for that purpose is apparent, by the words, *Membrana caprina, agnina, ovilla, vitulina, et hoedina*, which are found in several authors.

But such membranes are very different from the true parchment, *Charta Pergamena*.

Ptolomæus the First,* King of Egypt, who died in the year of Rome, 470, established in Alexandria, a very extensive
five

* Sometimes named *Soter* and *Lagus*.

five library, which was much enlarged by his son Ptolomæus Philadelphus, with the assistance of his librarian Demetrius Phalereus. Eumenes, King of Pergamus, as has been before stated, contended with, and endeavoured to surpass him if possible, which created jealousy; and caused Ptolomæus to prohibit the exportation of Egyptian Paper, under heavy penalties. It may be that this prohibition was not solely occasioned by jealousy, but from the fear that his dominions, which were so much improved in arts, sciences, and civilization, since the discovery of Paper, would be again reduced to a state of ignorance for want of Paper, because the plant failed sometimes in unfavourable weather. The Pergamians were therefore obliged to devise other means for making Paper, and they discovered the manufacture of useful parchment, about 300 years before Christ, and in the fifth century of Rome which obtained its name from

from the city of Pergam, or Pergamus, in Asia (now Pergamo), the place where it was invented, and the art of bringing it to such a state of perfection, that according to Prideaux and Freret, it greatly surpassed the Egyptian Paper in fineness, smoothness, and strength; and the art of making it very thin arrived likewise in a short time to a surprizing degree of perfection. Rome manufactured the best parchment. The first inventor could only manufacture yellow parchment; yet in Rome it was soon improved, and made white: but as that delicate colour was too liable to tarnish and spot, it was only made white on one side, and the other left yellow; and if it was to be used for writing on both sides, it was coloured violet and purple, and the letters were written thereon in gold or silver. Gold was only used for sacred writings, and principally for the Psalms and Gospels.

Josephus states, that the High-Priest Eleazar sent to Ptolomaeus Philadelphus a copy of the Holy Scriptures which was to be translated into Greek by seventy-two interpreters. The king greatly admired the beauty thereof and the fine membranes, (*tenuitatem membranae*) on which it was written with golden letters. But the translation has been made in Egypt only 285 or 286 years before Christ, by the Synedrion, which consisted, like the Hierosolymitanic, of seventy-two learned men, who not only made the translation, before it was laid for the King, and introduced into the synagogues, but revised it with some alterations. It was only the Pentateuch, or the five books of Moses, because the other parts of the language of the Jews at that time were not considered as parts of their laws, and therefore less necessary for the Egyptian Jews; and it is clearly proved by the latter part of the book of Esther, that it has been translated

translated into Greek by another translator.

All the world at that time did not use solely Paper and Parchment for writing upon, but stones and metals; the last were chiefly continued on account of its durability, and all nations had not attained a knowledge of the useful inventions of the Egyptians and Pergamians. Parchment came into use in Europe not before the sixth century, which increased in the eighth and ninth; and England and Germany made very little use of Egyptian Paper for diplomas, but parchment, till the year 1280. I am informed that before the invention of Rag-paper, nothing else was used in Germany for diplomas than parchment; and, notwithstanding, no map of parchment made before the sixth century has been discovered.

With respect to the size, length, and width of the parchment, it was not regulated like the Egyptian Paper, and there are documents as small as our playing-cards. There was likewise no adopted rule, if written at length or at the sides; it depended on every one's fancy: but as it commonly was used only on one side, it was more generally written sidewise than lengthwise, to save space. When printing was invented, parchment was likewise printed upon; and at Berlin, Brunswic, Paris, and St. Blaise,* are copies of a bible, printed in the year 1450, on parchment, by Guttenburg, in three folio volumes. At the University library at Helmstadt is the *Officia Ciceronis*: and from the library of the late Mr. von Duve was sold, by public auction, the very scarce work, printed on parchment, *Chronica Figurata totius mundi a Hartm. Schedelio*, Doct.

* An Abbey of the Benedictines, in the Black Forest, in the Bishopric of Constance. The Abbot is a Prince of the German Empire.

Doct. Norimb. of. Anton. Koberger, printed in folio, 1493, with copper-plates.

Parchment should be only made of calfskins, to be entitled to its name; but it is in modern times likewise made of the skins of sheep, goats, asses, and hogs. I shall not enter into a description of the manufacture of parchment, or repeat the various ways in which it is used, new or old, but only observe that in France there is annually the value of upwards of a million of livres of parchment manufactured.

Every one well knows that the use of parchment is still continued in Europe, not only because it is more durable than paper, but also that it can be converted into size when old and useless. But the high price thereof prevents its general use; it would be therefore of great consequence to the publick, if a substitute could be invented, equally as durable as parchment.

Such

Such a discovery would be highly beneficial, as it would not only encrease the writing and printing material, but reserve such a large quantity of animal skins for the use of leather, which becomes daily more scarce. In many libraries are manuscripts of calves-parchment to be seen with painted pictures. The art of painting on parchment was common before the art of painting with oil-colours was discovered. The miniature paintings on parchment of Johannes de Brugges, painter to King Charles the Fifth, and those of Julio Clavio, which were painted in the year 1500 in the Virgiluis of the Vatican merit to be noticed. And in the palace of the King of Naples has been preserved a book with miniature paintings on parchment, by Macedo, Scholar of Michael Angelo. Parchment takes all kind of colours, but actually is only painted, red, green, and blue; except by the Dutch who dye it likewise yellow, and its principal beauty

beauty is, that it can be made not only coloured but also transparent.

I shall now continue my historical account, and observe, that it is erroneous to state that the Arabs invented, in the eighth century, the manufacture of Paper from cotton: and Casiri, who states it to have been discovered in the year 706, by Joseph Amra, cannot deny that it was known before that time by the Chinese and Persians. The Arabians are therefore not the inventors, and acquired the knowledge of making it only in 704, by their conquests in Tartary. This invention became then more generally known, but the art of manufacturing it was only imported in the eleventh century into Europe; and neither is the year of its discovery precisely known, nor the inventor's name. The first paper of that kind was made of raw cotton;* but its manufacture

* This must have been unknown to *Guetard*, or he would not have stated that he was the first who had

manufacture was by the Arabians extended to old worn-out cotton, and even to the smallest pieces thereof.

But as there are cotton-plants of various kinds, it is natural that these must have produced papers of different qualities; and it was impossible to unite their woolly particles so firmly as to form a strong substantial Paper, for want of sufficient skill; and also for want of European mills (which are not yet established by the Moors, Arabs, and Turks, who make use of mortars, and hand and

ascertained by experiment, that raw cotton-wool could be converted into Paper, without being previously used for clothing or other purposes. It seems he has been misled by the Jesuit *du Halde*, who says that the Chinese made their Paper from cotton-rags. *Guetard* also asserts, that he was induced to make his experiments, because he had not found an author who mentioned the practicability of making Paper from cotton-wool; and that by beating it to a pulp he has made fine white Paper of it. But if he had read *Theophilus Presbyter* and *Monachus*, he would have been informed that in the Eastern countries it was customary to make Paper of cotton-wool.

and horse-mills*), it was impossible they could bring their wool, by that method, and by boiling and beating, to a fine pulp, rendered intirely free from its woolly quality.

Not

* Those who have travelled in Asia and Africa take very little notice of Paper manufactures and mills, Niebuhr declares in the first volume of his travels (page 150) positively, that he saw in Egypt, neither water or wind-mills, and that the publick corn-mill, worked by oxen, at Kahira, was used not only for grinding corn, but likewise for pressing oil-cakes; and that the common people grind their corn with very simple hand-mills. He gives of all these mills a design and description, which enables us to ascertain, that they cannot be employed for making paper. The Arabs and Turks give themselves at present very little trouble for making paper, being plentifully supplied by the Italians and French. There is nevertheless near Constantinople, on a rivulet, a paper-mill, which is named in the Turkey language *Kehatjana*, or Paper-manufactory, and makes Cotton-paper. The Greeks use water-mills, and built this mill; all the other mills in Constantinople are Horse-mills, of which several hundred were burnt in August 1782. Du Halde in his travels in 1697 takes no notice of Paper-mills in China, and mentions only a Paper-manufactory at Ming-hya. And Navarette states not in his travels, published in folio at Madrid in the year 1676, at *Fon-gan* in his road from To-chew to Peking, that he saw several paper-mills, as is erroneously translated: he says only, that he saw several paper-manufactures, without naming them paper-mills.

Not discovering in such ancient cotton-paper, stripes or water-marks, or the prints of wire resembling those of our moulds, we must presume that their forms were not like our skilfully invented moulds, through which the water runs off, and the mass remains therein united.

The Christian disciples of Moorish paper-makers, who since 1085, were in possession of Toledo, and in 1238, of Valencia, worked the paper-mills to more advantage than their predecessors: instead of manufacturing Paper of cotton-wool (which is easily recognized by its being brittle and remaining always yellow), they made it of cotton-rags, in moulds through which the water ran off: for this reason it was called parchment-cloth. Beside these denominations, the historians of that time call it *Charta*, *Xylina*, or *Gossypina*, from the cotton-plant; *Charta Bombycina*, from the shrub *Bombar*, by which name it was likewise described

described in England; *Charta Cotonea*; *Charta Damascena*; and *Charta Serica*.

All civilized nations used first the Egyptian and then the cotton-paper, but had not any idea of using linen for the same purpose; and to this day the Eastern nations who manufacture their own Paper, and even the Greeks, employ only cotton-wool and cloth for that use; and are so much accustomed to strongly glazed Paper, that when they receive Rag-paper from Italy and the south of France, they glaze it till it resembles our glossy linen cloth.

It is probable that the Greeks made use of cotton-paper sooner than the Latins. And that it was brought into Europe by the Greeks, at an earlier period than by the Moors from Spain, there is no doubt. The Greeks received it from the Tartarian countries at the Bukarias; and through Venice it came into Germany, where it was known

in the 9th century by the name of Greek parchment. Greece, so much connected* by commerce with Asia and Egypt; Italy, which was already in the 7th century frequented by the Arabs; Spain, which they conquered in the 8th century, and possessed to the latter end of the 15th; were, without contradiction, the European countries where cotton-paper was first used. The Arabs manufactured, at Cepta (which is, according to Manjanfius, now Ceuta), a cotton-paper, called Cepti; and Spain being so

* The connections of the Greeks with Italy and the Oriental Empire, and their navigation on the Black-sea, conveyed the knowledge of cotton-paper easily to Europe, notwithstanding no document of this paper has been preserved from Greek antiquity, or noticed before the time of the Empress Irene, wife of the Emperor Alexius Comnenus, who at the latter part of the eleventh or at the commencement of the twelfth century, made three copies of the rules for her nuns at Constantinople, two on parchment, and one on cotton-paper. The Genoese and Venetians, who established themselves afterwards in the Crimea, and carried on commerce with the Greeks and the countries on the Black-sea, took care of the exportation of cotton-paper to the European countries.

so near, could easily have been provided with it, until manufactories were shortly after established at Xativa, (or Sateba,) Valencia, and Toledo.

The stuff for this paper, cotton, was most likely cultivated in Spain by the people who had conquered it, because they came from a country where it was in general use, and they were therefore accustomed to it. There is yet more than one quality of cotton cultivated in Spain, and that commodity is considered in the Kingdom of Valencia as a home production; and it is not unlikely that the predecessors of the Arabs, (the Phœnicians and Carthaginians,) introduced it into Spain. Swinburne calculates the produce of cotton, the growth of Valencia, at 450,000 arobes, value 350,000*l.* which is in some measure confirmed by Twiss, who saw, between Cordova and Granada, several fields full of cotton-plants* in his travels through Spain in 1772 and 1773.

The paper-manufactories at Xativa, Valencia, and Toledo, produced only very coarse cotton-paper till the Moors were driven from Spain, either by the Arabians or Christians. The Spaniards being acquainted with the use of water-mills, improved the method of grinding the cotton-wool and rags; and by stamping the latter in the mill, they produced a better pulp than from the wool, from which various sorts of Paper were manufactured, nearly equal to those made of linen-rags.

Spain still possesses residues of cotton-paper. At the convent of Silos, is a Latin vocabulary, of intermixed parchment and thick cotton-paper-leaves, written in Gothic characters, the date of which must have been prior to the reign of Alphonfus VI. as the

*Dillon, in his Travels through Spain, mentions cotton as a natural production, and it is surprising that Ulloa, a Spaniard, in his *Retablissement des Manufactures et du Commerce de l'Espagne*, has omitted the mentioning of cotton.

the use of *Gothic* writing was forbidden in 1129 at the council at Leon. As very few manuscripts are found on cotton-paper from the 10th to the 12th century, but the major part on parchment, or intermixed, it must be supposed that at that time cotton-paper was scarcer than parchment, or that this mixture was necessary because sufficient parchment could not be obtained, and that the cotton-paper was too tender and more liable to break.

The Arabian author, Scherif al Edrissi, certifies that in 1151 very fine white cotton-paper was manufactured; and Cacim Aben Hegi assures us that the best was made at Xativa.

The King, Peter II. of Valencia (or the fourth King of Arragon) issued, in 1338, a command to the paper-makers at Valencia and Xativa, under pain of punishment, to manufacture better Paper, which was to be equal

equal to that formerly made. Mr. Meerman had in his possession a piece of very coarse cotton-paper, written upon in 1339, which proves that the art of paper-making was neglected by the Spaniards; and that prior to the middle of the 14th century no linen-rag Paper had been manufactured in that country. This has been fully ascertained by the above gentleman, from the repeated examination of several pieces of Paper sent to him for that purpose. Notwithstanding, their scientific men persist in its being linen-paper.

Cotton-paper came into use in France shortly after its invention; and until 1311, no other Paper than this and the Egyptian Paper was known in that country.

At what period cotton-paper was introduced into England cannot be ascertained with accuracy. The most ancient manuscript which can be produced is of 1049:
and

and it appears that its use continued till the latter end of the 14th century, and that it has been gradually supplanted by the linen-paper, which came into use in 1342. All documents written between 1282 and 1347, which Ducarell erroneously states to be linen-paper, are written on cotton-paper, as is the *Carmina aurea Salomonis Regis*, in *His Majesty's library*, composed in the fourteenth century, in the Greek and Latin languages; at least there is no reason to doubt what Mr. Meerman states on this subject.

Of the introduction of cotton and linen Paper into Scotland, nothing can be ascertained; and it is singular that it has not been noticed by Thomas Ruddiman. The same is the case with Ireland. But discoveries may yet be made in these countries.

The knowledge of cotton-paper came by means of the Greeks to Italy; and the art
of

of making it, in Sicily, through the invasion of the Saracens. It is certain there was no linen-paper used before 1367.

The bulls of the Popes Sergius II. John XIII. and Agapetus II. were written in the eighth and ninth centuries, on cotton-paper. Dufresne quotes under the article *Charta Cuttunea*, from *Rocchi Pyrrhi Sicilia Sacra*, a place where the family of a paper-maker is mentioned, but no time is noticed, notwithstanding a full account is given of a cotton-paper manufacture which we have not of any other country.

The large paper-manufacture at Fabriano, in the *Marchia Anconitana* (which, according to Bartolus's description, consisted of several different mills belonging to different persons, although the whole formed only one manufacture), was established long ago, but was enlarged from time to time, and manufactured, at the period when Bartolus wrote,

wrote, nothing but cotton-paper. This author died in 1355; so that it seems that 1367, or thereabouts, was the time when linen-paper was brought into use in Italy: and cotton might have been some time before mixed with linen-rags, till the superiority of the latter was fully ascertained.

As soon as the use of cotton-paper was adopted in Italy, it was also introduced into Germany; and, at the commencement of the ninth century, well known under the name of Greek parchment. Germany imported the paper some time before it manufactured it; and notwithstanding it received the stuff through the same channel as the Paper, and that cotton and flax were spun and wove in the tenth century, the manufacture of cotton paper cannot be traced in Germany to such an early period: all that can be positively ascertained is, that in the middle of the fourteenth century, it was made by stamping-mills. But as Ger-

many

many had in the thirteenth century, already cotton and linen manufactures, and exported considerable quantities thereof to Italy, it is fair to presume that cotton paper was also manufactured.

Germany possesses numerous well-known relicks of cotton-paper, and amongst the numerous manuscripts preserved in the archives, convents, and libraries, there may be still more ancient documents than any which are yet come to our knowledge, and which remain unknown for the want of a precise examination. In the collegiate church and cathedral at Gandersheim is a *plenarium* of the tenth century, which amongst other rarities of that church boast of five documents and grants, given by the founders of the convent, between 844 and 968, by the Duke Ludolphus of Saxony, by his son the Duke Otto, and by the Popes Sergius the Second, Agapetus the Second, and Johannes the Thirteenth. The Plena-

rium

rium is likewise written on cotton-paper, in the reign of the Emperor Henry the Second, and attested in 1007 with the imperial confirmation by his notary Apel Peranfa. A large manuscript of 1095 is at the Imperial Library at Vienna. The University Library at Erlangen has a collection of 420 manuscripts on parchment, and 150 on cotton-paper. In the convent at Weirgarten are preserved numerous codices and manuscripts of all centuries, and on every kind of materials and paper. In the convent at Rheinau are 490 manuscripts on different kinds of paper. The library at the Vatican contained 50,000 volumes, amongst which there were 17,000 manuscripts. In the city library at Augsburgh are numerous manuscripts, and many of them in Greek more valuable than those at the Vatican. The Library of the Convent at Tegernsee contains 1500 manuscripts of the 8th, 9th, 10th, 11th, 12th, 13th, 14th, and 15th centuries; and in the Abby of St. Blaise, are
some

some of the fifth century. The university Library at Harlem, and the Library of the Abby St. Emeran are rich in old manuscripts; and the chapter at Salzburgh produces 58 *Codices chartaceos*, of cotton Paper, amongst its collections.

I now conclude the historical account of the several substances which have been used as writing materials, with the invention of linen Paper.

The Royal Society of Sciences, at Gottingen, has, in the years 1755 and 1763, offered premiums to trace the exact time of this discovery; and Mr. Meerman printed in 1762 at Rotterdam, *Gerardi Meerman, Syndici Roterodamensis, Admonitio de Chartæ nostratis, seu lineæ, origine*, and offered 25 ducats to find it out. All researches were lost and reduced to an uncertainty, through the existing remnants of cotton Paper, which was as before stated in use some centuries before

before the linen Paper, because these two are in many respects similar, and cotton and linen rags may have been at first mixed, which rendered it therefore more difficult to ascertain when the first Paper was made from linen rags alone.

The Jesuit Du Halde attributes this invention to the Chinese; but as Gerbillon, and other modern travellers assure us that in the Paper-manufacture at Ming-hya, raw hemp was beaten and macerated with drugs, and then manufactured into Paper, this nation cannot exclusively claim the discovery of the art of making Paper from linen rags; and all authors agree that Europe is entitled to the merit of this invention, but they differ as to the time;* some trace it to the

* Hertius, who seemingly had no knowledge of cotton-paper, believes linen-paper was invented in the sixth century.

Orlandi quotes a manuscript of Homer in the Library at Geneva, written on linen-paper before the year 800.

the 8th, 10th, and others to the 11th and 12th century; and it is most likely that Paper has been made from linen cloth before it was attempted to be made from linen rags.

It is to be observed, that the invention of making paper from linen, has been preceded by the art of making paper of cotton-rags, which must be considered as a preparatory step towards the use of linen-rags for the same purpose. But as this required some time, and improvements of the first discovery, it is therefore more natural that this invention

Muratori believes that linen-paper has been first named *Charta bombycina*, and invented in the tenth or eleventh century.

Harduin will make us believe, that he has seen acts and diplomas written on linen-paper before the twelfth century; and Casiri says; *Non pauca in regia Escurialensi Bibliotheca extant monumenta, quae ante tertium decimum Christi seculum sunt exarata.*

But Montfaucon states the contrary, and insists that he has not discovered, either in France or Italy, a book, instrument, or manuscript written on linen-paper previous to *Ludovicus sanctus*, who died since 1270.

vention is to be ascribed, to a country, which was more familiar with linen, and its agriculture, than with the application of cotton.

Gregorius Majanſius, of Oliva; Franciſcus Perez, of Toledo; and Ferdinando Velasco, of Madrid, endeavoured to trace this discovery in Spain, but could not prove that their country was entitled to the merit of it, being completely defeated by a number of other authors; and it seems that the Spaniards had no knowledge of linen Paper before the middle of the fourteenth century, and then it was not manufactured in that country, but imported; and it is most likely linen and linen-rag Paper were only manufactured in Spain a short time before the art of printing was introduced. Spain cannot therefore claim the merit of this invention; notwithstanding several places in Spain produce very good flax;* and even

* Twiss relates that he found in the kingdom of Valencia

soon after that they manufactured Paper from linen rags, these manufactories went to

lencia flax and hemp in abundance, where the commonest class of the people wore linen apparel. He observes also that the fruitful plains of Granada produced likewise flax and hemp. The cultivation of hemp and flax is at present very considerable; in Valencia are annually 25,000 cwt. of hemp, and 30,000 cwt. of flax cultivated. The exportation of hemp from Aragonia was in 1775, 22,000 cwt. But it is certain, that Spain consumes at least ten times more flax and hemp than it cultivates, and even this was then not manufactured, being in the habit of purchasing their linen, sails, and cordage from France, England, Germany and the Northern Countries. According to Pluce, there has been imported in the year 1765 in Sevilla, foreign linen-cloth to the amount of 1,200,000 dollars (270,000*l.*) In the kingdom of Spain has been imported 24,000 cwt of flax. Since the foundation and establishment of the Patriotic Society in Spain, the linen-manufacture is more flourishing, and the hemp and flax of their own growth is not only manufactured, but also large quantities of imported. In Barcelona has been manufactured, in 1783, linen cloth to the value of thirty millions of reals. But as long as hemp, imported from Riga, with the duty paid thereon, can be sold at a lower price in Spain, than its own growth, the cultivation will not be cherished, and equal the actual prosperity of the linen manufactories; and notwithstanding the flax and hemp plant is dispersed all over Europe, its cultivation is still more proper for the Northern climate.

to decay, because the Kings of Spain first granted monopolizing privileges to many convents for the manufacture of Paper; and when it came again into private hands, they fixed such a low price on printed books, of which the Genoese availed themselves, and procured considerable quantities of rags from Spain, principally from Andalusia; and in 1720, they sent Paper back to Spain to the amount of 500,000 piastras. There are at present upwards of 200 Paper-mills in Spain, 31 of which are at Alcoi, and Francisco Guarro manufactures Paper as good as any Dutch.

Peris communicated to Majansius some works of Aristotle, translated in the year of the world 5010, from the Arabic, by Moses Samuel Bar Ichdua Ben Thibun at Granada, which is in the year of Christ 1250. The two different sorts of paper, on which was written in Hebrew, out the Royal Library at the Escorial, and sent by

Majanfius to Meerman, have on examination been found to be white linen-paper; they were written at the end of the reign of Alphonfus the Tenth, and at the commencement of the reign of his fon Sanctius, between the years 1280 and 1290. But notwithstanding it is decided by thofe Antiquarians, to be linen-paper, it differs fo much in quality and colour from all other paper manufactured in Spain, that it is more probable that it has been copied in later years on imported paper, and the date written thereupon, is by no means a pofitive proof of its antiquity. The moft ancient linen-paper which can be with certainty traced is of 1367; it is a piece of a manufcript of *Francifci Eximii Vita & actis Chrifti*, and is intermixed with fheets of parchment. It has fcizzars for a watermark, which was one of the ufual watermarks in Germany and Italy in the fifteenth century.

France made an early ufe of linen Paper,
but

but manufactures were later established there than in Spain and Italy: Lint or flax, was cultivated by the Gauls at an early period; but the clothing with linen became only a custom many centuries afterwards; and the authors of the eighth century quote as a remarkable thing that the holy Segolena was dressed in a linen shift, and that the Queen of France, wife of Charles the Seventh, was the first French Queen who wore shifts of linen cloth; which was in the fifteenth century. This is not a proof that no Paper was made of linen before that time. Several authors prove the use of linen Paper in 1270, 1294, 1302, 1314, and 1316, but not that it has been manufactured in France, and we have no account for several centuries what kind of linen Paper was made in that country, which the authors would not have left unnoticed; and therefore no Paper manufacture can be traced before the fifteenth century. These manufactures became in a short time very flourishing, and the French

soon exceeded their neighbours in the art of making Paper, and were therefore enabled to export considerable quantities, which encreased so much yearly, that in 1658, of thirty-five millions of livres exported in goods and merchandize to Holland, two millions in value were of Paper; and it provided Spain, England, Switzerland, Denmark, Sweden, Russia, but chiefly Holland and the Levant, with Paper for printing and writing. The Paper manufactures in Languedoc, Lionese, Guienne, Bretagne, and Poitou work principally for exportation; and the fourteen mills in Alsace, which manufacture about 40,000 reams of Paper annually, export about two-thirds thereof to Switzerland and Germany.

As the French still export a considerable quantity of Paper, I think it worthy of notice, to state the names, length, width, and weight of all the different sorts of Paper, now manufactured in France,

Names.	Length	Width	A Ream should weigh	And at least
	in. lin.			
Grand Aigle . . .	24 9	36 6	131 lb. and upwards	126 lb.
Grand Soleil . . .	24 10	36 0	112 lb. not exc ^d 120 lb.	105
Au Soleil . . .	20 4	29 6	86 and upwards	80
Grand Fleur de Lis . . .	22 0	31 0	70 not exceeding 74	66
Grand Colombier ou } Imperial . . .	21 3	31 9	88 and upwards	84
A l'Elephant . . .	24 0	30 0	85 ditto	80
Chapelet . . .	21 6	30 0	66 ditto	60
Petit Chapelet . . .	20 3	29 0	60 ditto	55
Grand Atlas . . .	24 6	26 6	70 ditto	65
Petit Atlas . . .	22 9	26 4	65 ditto	60
Grand Jesus ou Su- } per Royal . . .	19 6	26 0	53 ditto	48
Grand Royal étranger	18 0	25 0	50 ditto	47
Petite Fleur de Lis . . .	19 0	24 0	36 ditto	33
Grand Lombard . . .	20 0	24 6	36 not exceeding 40	32
Grand Royal . . .	17 10	22 8	32 and upwards	29
Royal . . .	16 0	22 0	30 ditto	28
Petit Royal . . .	16 0	20 0	22 ditto	20
Grand Raifin . . .	17 0	22 8	29 ditto	25
Lombard . . .	18 0	21 4	24 ditto	22
Lombard ordinaire . . .	16 6	20 6	22 ditto	20
Cavalier . . .	16 2	19 6	16 ditto	15
Petit Cavalier . . .	15 2	17 6	15 ditto	14
Double Cloche . . .	14 6	21 6	18 ditto	16
Grand Licorne à la } Cloche . . .	12 0	19 6	12 ditto	11
à la Cloche . . .	10 9	14 6	9 ditto	8
Carré, ou Grand } Compte, ou Sabre, } Sabre au lion . . .	15 6	20 0	18 ditto	16
Carré très mince . . .	15 6	20 0	13 ditto	13
A l'écu, ou moyen } Compte, Compte } ou Pomponne . . .	14 0	19 0	20 ditto	15
à l'écu très mince . . .	14 2	19 0	11 ditto	11
Au Coutelas . . .	14 2	19 0	17 ditto	16

Names.	Length	Width.	A Ream should weigh	And at least
	in. lin.			
Grand Messel . . .	15 0	19 0	15 and upwards	14
Second Messel . . .	14 0	17 6	12 ditto.	11
à l'étoile, à l'éperon, } ou longuet . . . }	13 10	18 6	14 ditto	13
Grand Cornet . . .	13 6	17 9	12 not exceeding 14	10
Grand Cornet très } mince . . . }	13 6	17 9	8 and less	—
Champy, ou Bastard	13 2	16 11	12 and upwards	11
à la Main	13 6	20 3	13 ditto	12
Couronne, ou Griffon	13 0	17 1	12 ditto	10
Couronne, ou Grif- } fon très mince . . . }	13 0	17 1	7 and less	—
Telliere grand Format	13 2	17 4	12 and upwards	10
Cadran	12 8	15 3	11 ditto	10
La Telliere	12 8	16 0	12 $\frac{1}{2}$ ditto	11 $\frac{1}{2}$
Pantalon	12 6	16 0	11 ditto	10
Petit Raifin, ou Ba- } ton Royal, ou Pe- } tit Cornet à la } grande forte . . . }	12 0	16 0	9 or less	8
Les trois O ou trois } ronds, ou Genes . }	11 6	16 0	9 and upwards	8 $\frac{1}{2}$
Petit nom de Jesus . .	11 0	15 1	7 $\frac{1}{2}$ ditto	7
Aux armes d'Am- } sterdam Pro Patria } ou Libertas . . . }	12 1	15 6	12 to 13	12
Cartier grand For- } mat, Dauphine . . }	13 6	16 0	14 and upwards	12
Cartier grand Format	12 6	16 0	13 ditto	12
Cartier	11 6	15 1	11 ditto	10
Au Pot, ou Cartier } ordinaire . . . }	11 6	14 6	10 ditto	9
Pigeon, ou Romaine . .	10 4	15 2	10 ditto	8 $\frac{1}{2}$
Espagnol	11 6	14 6	9 ditto	8
Le Lis	11 6	14 1	9 ditto	8
Petit à la Main, ou } Main Fletvie . . . }	10 8	13 8	8 ditto	7 $\frac{1}{2}$
Petit Jesus	9 6	13 3	6 ditto	5 $\frac{1}{2}$

All forts which are less than nine inches and six lines in length, are permitted to be made of such a width as may be required.

That Paper called *Trace, Tresse, Etreffe*, or *Main-brune*, and of the names *Brouillard*, and *à la Demoiselle*, and all coloured Papers may be manufactured of such length, width, and weight as ordered.

There are three forts of French Paper which are exported to the Levant, that are not above described:

	Inches.	Inches:	
Aux trois Croissans, Façon de Venise,	12½ 0	long,	17 0 wide, 20lb. 00z.
Aux trois Croissans, ou trois lunes,	12 0	16 0	14 10
Croisette	11 6 lines,	15 5 lines	9 4

The Papers called *Couronne, Cartier*, and *à la Cloche*, if designed for the Levant trade, differ from the before-mentioned size and weight. In *Savary's Dictionnaire Universel de Commerce* are mentioned twenty different
forts

sorts of common Paper, made out of old nets and cords, maculated and blotting Paper, to which the French have likewise given different names, but I have omitted them, as they do not contribute to the knowledge of the commerce with Paper, nor to improve and extend our manufactures, which was the motive I had for giving here so long a detail; whereas I have endeavoured to abbreviate this historical account, in other respects, as much as possible. I will now continue to describe the remaining sorts of Paper manufactured in France.

Demoiselle mince is made of the finest threads of fishing nets, and being more stamped in the mill, loses its natural colour, and becomes of a cinnamon colour.

Demoiselle forte is less stamped, and of a dark brown colour.

Joseph

Joseph Raifin, and *Quarré Mufe*, are made of coarser nets and cords, which are not stamped fine. These two sorts are used for packing up the linen cloth at St. Quentin, Beauvois, and Troyes, because their dark brown colour sets off the whiteness of the cloth; and it seems that the manufacturers put some lamp-black in the engine, to darken the colour.

The Paper, called *Papier à Sacs*, is made of the coarsest rags, and is sold by weight; it is surprisngly brittle, and the manufacturers are therefore suspected of mixing it with something to encrease the weight, or it could not be so tender.

At the latter end of the last century the art of making Paper arrived to a great degree of perfection in England and Holland, so that the sale in France has not since been so extensive, and many Paper-mills have been shut up, or converted to other purposes.

purposes. There were, a century ago, in the provinces of Perigord and Angoumois 400 Paper-mills, and now there are not one hundred remaining. But the exportation of Paper from France remains nevertheless very considerable; and it still manufactures, after England and Germany, the largest quantity of Paper of any country in Europe. It exports very large quantities of all sorts, chiefly that manufactured for Paper-hangings, to the United Provinces of America, for which reason, on the 29th of December 1787, the exportation-duty on paper shipped for that country was not only taken off, but also the excise returned. At Montargis is the largest paper-mill, erected to work with 30 vats, which would consume 1,620,000lb. of rags, and 135,000lb. of size, but want of water, and the quality thereof, has prevented its working to its full extent. At Vougeot, in Burgundy, is another large mill, with 12 engines and 20 vats, erected by Mr. Desventes, of which Mr. De Lande

lande has furnished the public with a complete description, and the drawings of all its parts and machineries.

The printing and writing-papers manufactured in Auvergne are preferred to all other French paper, except that manufactured by Mathieu Johannot d'Annonay, which is principally esteemed for printing copper-plates. At Thiers are fifteen paper-mills, which bring beautiful writing-paper to the market; and at Ambert, where there are 50 paper-mills, and in Angoumois, principally printing-paper is manufactured, of a very good quality, the most part of which is sold at Bourdeaux, and exported to Holland: it is not sized, but much stronger pressed. In Limoges are 51 paper-mills, which work 66 vats. In Normandy, and the environs of Rouen and Caen, are numerous paper-mills. The valleys near Rouen provides Paris principally with copy and packing-paper. In the small compass of
three

three leagues, near Rouen, are 34 paper-mills; and in a circle of 15 leagues, are 20 others. There were formerly many more, some of which were converted in 1748 to other purposes, principally fulling-mills. In the Franche-comté are 27 paper-mills, which work with 30 vats, and are situated on the foot of rocks, where they have a constant supply of clear water; they export their Paper principally to Switzerland.

The paper-manufacture attained to perfection in France much sooner than in Holland and England; which, with the cheapness of labour, gave them a certain superiority in foreign markets, which has gradually diminished, and will remain so, if no new improvements and inventions contribute to its rise. Mr. Robert Lewis in France two years ago discovered a way to make, with one man, and without fire, by means of machines, sheets of Paper of a very large
size,

size, even 12 feet wide, and 50 feet long. He has obtained a patent *.

In France are still upwards of 500 Paper-mills, which consume annually 20,000,000 weight

* This improvement in the art of making Paper will occasion a revolution in that manufacture, and if brought to perfection, enable them to undersell in foreign markets, because three men are now required for every sheet of paper: if now one man is able to make as expeditiously sheets of such a large size, where upwards of 300 sheets may be cut out, it is of a very great advantage to the manufacturer, who will thereby be enabled to make 900 sheets of paper with the same expence of labour, as he is now obliged to pay for a single sheet; and moreover he will be able to furnish perfect larger sheets of paper, than any other heretofore made, and which is much wished for, for drawing and several other purposes. Mr. Gamble, who arrived in London about twelve months ago, brought over several sheets from France, and has obtained a Patent which will in some respects contribute to the introduction of this improvement in the art of making paper in this country; others have likewise for months past employed agents in France, to purchase such machineries for use in this country, and if brought to a greater perfection, there is no doubt, it will be generally adopted and used in the British Paper-mills, and that their commerce will not be injured by this discovery in France,

weight of rags and coarse paper stuff. In Franche-Comté it was ascertained by the exchequer, that 16,000 cwt. of rags were collected within one year, of which 8,000 were manufactured in that county, and 8,000 exported to other counties: as Franche-Comté is only about one twentieth part of France, 320,000 cwt. of rags must be annually collected in that country, and upwards of one-third, or 14,000,000 weight are still exported, notwithstanding the severe prohibition.

In Switzerland, especially in the principality of Neufchatel (which belongs to the King of Prussia) and in the Cantons of Bern and Basle several Paper-mills are now established, which manufacture very good Paper, admired for its strength and whiteness, which diminishes the importation from France, and the manufactures at Pontarlier. The paper-mill of Mr. Blume, in the canton of Basle, has gained a superiority
in

in that country, and produces copper-plate paper equal to any manufactured in France.

The time when linen Paper came into use in Italy remains likewise uncertain; and as all that has come to the knowledge of the present time, cannot be satisfactorily ascertained, I will therefore quote only what may be regarded as authentic. The senate of Venice granted, the 19th of August 1366, an exclusive privilege to the Paper-mill at Treviso, that no linen Paper-shavings or offal should be exported from Venice than for the use of that mill; if now shavings from linen Paper existed, it proves the manufacture of that Paper must have been established some time before; a document of a notary, in 1367, proves likewise the use of linen Paper; Maffei states, that he is in possession of a family manuscript of linen Paper, written in 1367, and he attempts therefore to appropriate the invention of linen Paper to Italy, notwithstanding

it appears more likely, that by the manufactures of cotton paper, the linen paper has not been manufactured in Italy at such an early period. In 1374 the patent of the manufacture at Trevifo, which proved successful, was renewed by the senate of Venice. An extensive commerce in Paper was carried on at Venice for exportation. The city of Gorlitz received, from 1376 to 1426, all its Paper from that country.

Angelus Roccha mentions a Paper manufacture at Foligni, existing in the 16th century; and he says, that at Fabriano was manufactured the best large Paper; and at Foligni, the best Paper of a small size. The Paper-mills at Fabriano are yet in esteem, and there are the greatest number in Italy. In the Pope's territory at Tivoli, Viterbo, Ronciglione, Bracciano, and Rome, are many Paper-mills, but they do not make so much Paper as they might, from the quantity of rags gathered in that country; and Schlozer states,

states, that one million in weight is annually exported to Genoa. The value is entered at 100,000 scudi, or crowns.

Venice exports large quantities of Paper to the Levant,* and inferior assortments to the Austrian dominions: at Colli, in Tuscany,

* The commerce of Paper to Turkey is principally carried on at Venice: the assortments are white, thick, and very close: the Turks cannot make use of any weaker Paper, because they use a reed for writing, which is cut into the form of a pen. Those called *fioretto* and the *three moons* are in the greatest request, being very strong and very heavy. The *fioretto* is the most fashionable kind of Paper, and the dearest. The Turks gum it, and brighten it with a polishing-instrument.

Next to Venice, Genoa is the place in Italy which exports the greatest quantity of Paper to the Levant. The Genoese Papers are much lighter and not so dear as those of Venice: they are made use of in winter instead of window-glass, for œconomy.

Upon the whole, Italy sends Paper into Greece to the amount of 25,000*l.* and into Turkey to the amount of 250,000*l.* which ought to be noticed by our merchants and Paper-manufacturers, and engage them in a competition with the Italians in this important branch of the Levant trade, principally as Marseille has been, of late years, the only place in France that can circulate any of its Papers in Turkey.

Tuscany, is a mill which manufactures very good Paper. In the environs of Turin are several mills which furnish fine Paper; one Paper-maker in Venice is in possession of the secret of covering his Paper with a varnish, by which means the writings can be easily obliterated with a sponge, and he has found an extensive sale for this Paper. The Genoese had some time ago monopolized the Paper-trade of Italy, by manufacturing it of a superior quality and whiteness, and by using a particular size, which it is said prevented its destruction by moths; but this commerce is now greatly reduced.

Germany disputes with Italy the most ancient knowledge of cotton and linen Paper. There were already in the 13th century cotton and linen manufactories established, which exported large quantities of goods to Italy and to the Levant; and it cannot therefore be surprising that the art of inventing linen-rag Paper is

is judged to belong to Germany: but nothing has been ascertained with certainty. The several ancient manuscripts and pieces of linen Paper preserved in Germany do not positively ascertain that the first manufacture was established in that country. There have been always quoted two diplomas, to prove the age of the use of linen Paper in Germany; the one is of Count Adolphus the Fourth, of Schaumburgh, who therein confers in 1239 on Rinteln the right and privileges of a city, and which has been made known to antiquarians by Professor von Pestel at Leiden; the other is of the year 1303, which Professor Popowitsch at Vienna declares to have seen in the archives of the city of Windischgraetz in 1740. Both diplomas would be misleading others, if accepted as proofs of the antiquity of linen Paper in Germany; that at Windischgraetz is only quoted by memory, and the other of Rinteln is still more

suspicious, and wants the day and month when executed, which is found in all other diplomas given by the said Count Adolphus, and according to Spangenberg and Bierling, Rinteln did not receive the right and privileges of a city till the year 1340, which is 101 years later. But one piece of Paper, of 1308, which Mr. von Senkenberg sent, in 1763, to Mr. Meerman, merits particular attention; it was strong, white, pliable, and had the marks of the wire-moulds, which are the tokens of linen Paper; it was nevertheless glazed, and much resembled parchment, which are tokens of cotton Paper. The Royal Society of Sciences at Gottingen judged therefore, if the date could be taken as certain, that the epocha could also be taken for the true time when linen Paper was invented, notwithstanding Professor Murray believes it to be mixed Paper, of linen and cotton, manufactured at Fabriano. If it should be linen Paper

manu-

manufactured in Germany, it must have been, according to their opinion, on the frontiers of Italy.

Von Stetten is of opinion that linen Paper was manufactured at Augsburgh earlier than in any other part of Germany. That city was the first which established considerable linen-manufactories, and carried on in ancient times an extensive commerce in linen. Nevertheless, the establishment of mills cannot be ascertained, nor the precise time when the first paper-mill was built on the Sinkel-stream. Longolius at Hoff endeavours to establish it as a fact, that linen Paper has been made at Augsburgh at the commencement of the fourteenth century, by a diploma in the archives of the Prince of Onolzback, by the Bishop Frederick of Augsburgh, which is without date, and it states that the said bishop was of the house of Speet von Thurnegg, who reigned between the years 1307 and 1330, that the

Paper

Paper must therefore have been manufactured within or before that period. This diploma is, on the strictest examination, declared to be Paper made from linen; but Meerman still retains his doubts, because another Bishop of the name of Frederick reigned in Augsburgh in 1414, and that there are yet existing in Augsburgh publick accounts up to the year 1330 all on cotton Paper, in which repeatedly expenses are brought in *pro papyro*, without mentioning if for linen or cotton Paper.

That Pomerania had an early knowledge of Paper, has been satisfactorily proved by John Samuel Heringen, Professor at Stettin. He quotes a long list of signatures of the notaries to certify numerous diplomas from the Dukes of Pomerania, between the years 1263 and 1373. But we cannot take him for a sufficient judge of linen and cotton Paper, and therefore not decisive in opinion. A copy of a document of 1289, written in

1815 in monkish characters, containing a donation from Bishop Hermanzus to the convent of nuns at Cölin, has the water-mark of a bull's head with a cross on the top of a pike, raised between the horns; and Heringen believes, that this water-mark is an undeniable proof, that this Paper was made in Pomerania, in the diocese of the Bishop of Camin, and that the sign of the bull's head must be the arms of the family von Wachold, and that the cross is the sign of the bishop. But this opinion must be erroneous, even if we admit the water-mark to be a proof in what country the Paper has been made. The bull's head is the arms of Mecklenburgh, and the German princes are jealous of permitting their arms to be used by any branch of the nobility, not belonging to their own house. The water-mark, in the first invention of linen-paper, may have signified in what parts the Paper has been made, but has been since used to distinguish the quality of

of the Paper, or in which mill it was manufactured.

The water-mark of a bull's head in the Paper, which is not in any Italian Paper, and which scientific men take as an undeniable token of books printed in the first printing-office of Faust, is only the first water-mark made in the most ancient German linen Paper, and is found in all ancient German manuscripts, and the first printed books, with some alterations and additions: the first manufactured Paper of Germany is of the year 1312, with the water-mark of a plain bull's head, which may have been since adopted by Paper-makers of other countries, as it is still in practice with many sorts of Paper that are in great demand; for example, the words *Pro Patria*, which are water-marks in Paper like our foolscap, originated in Holland, but it is likewise made use of in French and German mills; and if the sign of a bull's or bullock's head, which

which are truly the arms of Mecklenburgh, is to be taken as a proof that the first Paper was made in that country which uses these arms, then is Mecklenburgh entitled to the honour of this discovery. This is supported by the situation of Mecklenburgh being on the frontiers of Pomerania.

In the archives at Wolgast is a document on linen Paper of 1393. In that of the hospital at Kaufbeuren are two of 1318, and in the archives of the city several others of 1324, 1326, and 1333. Von Murr found in Nuremberg linen Paper of 1319. The most ancient linen Paper preserved in the Netherlands, is the copy of a Bible in verse, by Jacob Maerlant, in the library of Isaac le Long, which Meerman saw and examined, when the library was sold by publick auction at Amsterdam, in 1744. A manuscript in Dutch, "*Het boek der Byen*" of 1330 written on linen Paper, is in the library of Hulsian. At Hohenloe is a document

document written in 1333, on the Friday after the Ascension. In the convent at Quedlinburgh is a bill of feoffment, granted by the Emperor Charles the Fourth, to the Abbess Ermingarde in 1339. Bohuslaus Balbinus asserts that in the archives at Prague are preserved several diplomas written before 1340, which have induced many to believe that the first linen Paper was made in Bohemia. In the library of the Minster at Fulda, are preserved with the manuscripts and letters of celebrated men, some *Decreta Judicialia* of the ancient abbots from 1341 to 1491, all written on linen Paper and with seals. John Daniel Fladd in Heidelberg discovered several documents written on linen Paper in the fourteenth century, the most ancient of which was in 1342. The Royal Society of Sciences at Gottingen adjudged to him a prize-medal of 25 ducats, for the discovery of the most ancient linen Paper. Helmstadt has exhibited a document of 1343; it is a little deed of an acre

acre of land, which a priest of Helmstadt purchased, and on which are two seals; and as he was in fear for the lasting of his document, the Paper being so thin, he applied to the magistrate for a duplicate on parchment, which is only two years younger. In the archives at Plaffenburgh is a record with a seal, dated 1347; and at Magdeburgh are several of 1350. Qualenbrinck at Utrecht discovered, in the bailiwick of Utrecht, three documents of the Teutonic order, two of 1353, and one of 1369. Fladd discovered another document on linen Paper of 1377, on the back of which is a wax seal; the Paper is rough, and the water-marks very plain. Gatterer at Gottingen found in the family archives of Holzschuher at Nuremberg a linen Paper document, with the seal on wax of Frederic Holzschuher, Knight of the Teutonic Order. The library of Paulin at Leipzig possesses a manuscript of the poet Hugo Trimberg, written in 1391.

It seems, by the numerous relics of ancient linen Paper in Germany, that it came into use there at the beginning of the 14th century, and Ulman Stromer of Nuremberg, who died in 1407, began in 1360 to write the first work ever published on the art of Paper-making, and established a large Paper-mill in 1390. He employed a great number of persons, amongst whom were three Italians, Franciscus, Marcus de Marchia, and Bartholomæus; all of them were obliged to make oath not to teach any person the art of Paper-making, or to make Paper for their own account. He employed another person of the name of George Thirman, who bound himself only for ten years. In the first year he employed two rollers, which set eighteen stampers in motion; but when he would in the second year add another roller, he was opposed by the Italians whom he employed, who would not consent to the enlarging of his manufacture; but they were imprisoned by the magistrates,

magistrates, and then they submitted by renewing their oaths.

All the Paper-mills erected, since the art of printing has been invented by Koster, of Haaerlem, in 1430, cannot be brought forward as a testimony to prove the invention of linen Paper-making in Germany; but, after the noble invention of printing (by which ideas can be so easily conveyed and dispersed) came in practice, the rapid extension and the multiplication of printing made the increase of Paper-mills necessary. In the environs of the Rhine, in Swabia, Franconia, Alfatia, Misnia, and Bohemia, are the greatest number of Paper-mills. In the Hanoverian dominions are 34, and Beyer states that there are in Germany 500 Paper-mills* (those in Austria and Prussia not included), which manufacture at least

2,500,000

* I subjoin here an account of some Paper-mills in Germany, as far as I could obtain knowledge thereof.

2,500,000 reams of Paper. According to
Count

1. In the Circle of Upper Saxony, in the Chur-Mark	4
Chur-Saxony	80
Swedish-Pomerania	2
2. In the Circle of Lower Saxony, in the Hanoverian	
Dominions	34
Mecklenburgh	6
Near Hamburg	2
3. In the Circle of Westphalia, in the Principality of	
Minden	1
County of Lippe	6
Abbey of Werden	3
County of Tecklenburg and Linden	3
In the Circle of the Upper Rhine, in the County of	
Ifenburg	2
Catzenellenbogen	2
Hanau-Münzenberg	1
5. In the Circle of Franconia, in the County of Henneberg	3
6. In the Circle of Suabia, near Augsburg	4
Ulm	1
7. In the Circle of Bavaria, near Regensburg	1
8. In Bohemia	81
9. In Silesia, in the Environs of Hirschberg	4
Sagan	2
Wartenberg	2
Schweidnitz	12

Which amount to 256

It is therefore apparent that there must be more than
600 Paper-mills in Germany.

Large

Count Ewald von Hertzberg, there were, in 1785, in the Prussian dominions 800 Paper-manufactures, the revenue thereof produced 200,000 dollars annually.

Large sums of money go notwithstanding from Germany to foreign countries, for the purchase of Paper, because the Paper-makers make in general coarse Paper chiefly for printing, and the finer sorts and writing-paper are imported. In the port of Hamburg were imported, in 1782, 7,439 bales (of 10 reams and upwards,) 4,336 reams, four casks, and three chests, with Paper. That city has no more than two Paper-mills, of two vats each, which consume 6,000 cwt. of

Large quantities of Paper-materials are lost in Germany, because the coffins in which they lay the deceased are filled in the most part of Germany with Paper-shavings; the bodies are likewise clothed with a linen shift or shirt, and are laid on a linen sheet.

Confiscated books are burnt in Germany:

of rags, and make principally dark purple paper for the sugar-bakers. The annual increase of printing presses, and the want of rags and Paper-stuff, has engaged the Paper-makers to make many more reams of Paper from one cwt. of rags than formerly, which renders the present German printing-paper very disagreeable to the printers and readers.

There are in the kingdom of Sweden no more than 24 Paper-mills. In Stockholm alone were imported, in 1781, 18,579 reams of Paper: 8,142 reams for writing, 5,786 reams for printing, and 4,651 reams of packing-paper, and coarser sorts.

When the Czar, *Peter Alexiewitz*, visited Dresden, in the year 1712, he saw the Paper-mill belonging to Mr. Schuchart, and made a few sheets of Paper with his own hands; he was so pleased with an art which surprises every person who visits a Paper-mill for the first time, that

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he immediately engaged Paper-makers, whom he sent to Moscow, to establish Paper-mills at his own expense: and Mr. Pfeiffer, a German, erected, with the assistance of a carpenter from Commothau, a very fine Paper-manufactory; to which the said Emperor granted great privileges. At Jaroslow is now a Paper-mill, with 28 engines and 70 vats, which manufactures weekly 1,100 reams of Paper, and consumes annually 800 tons of rags; and another which works 13 vats by 13 engines: they chiefly make Paper for Paper-hangings, which they sell at Moscow. There are 23 Paper-mills in the Russian empire, and, notwithstanding they are not in want of rags (the exportation of which is prohibited), they import annually Paper to the amount of 220,000 rubles.*

In

* The duty to be paid on imported Paper is as follows: for writing-paper, from 2 to 5 rubles per ream; coloured Paper from 2 to 4 rubles; blotting-paper, 3 rubles; all

In the government of Kaluga are several Paper-mills; and, according to Wafilii Szujew, all offal from preparing and weaving hemp and flax, with the spoilt yarn in the linen and sail-cloth manufactories, are delivered to the Paper-mills.

At the commencement of the present century there were very few Paper-mills in Holland, and the Dutch imported great quantities of Paper till 1723 from St. Malo, Nantz, Rochelle, and Bordeaux; but, since that time, they have erected numerous mills, and carried on an extensive commerce, which has suffered greatly since that country has been governed by the French Republic. In the province of
Holland

Paper used for making cards, 3 rubles; royal, 1 ruble 60 copecs, to 2 rubles; ploughed letter-paper, in quarto, 1 ruble 35 copecs; and if with gilt edges, 1 ruble 80 copecs; printing-paper, 75 copecs; pasteboards for the use of manufactures, 60 copecs for a hundred.

Holland were, in 1770, eleven large and considerable Paper-mills. In Gelderland are a great many, but some so small that they are only able to make 400 reams of Paper annually: and there are also water-mills with stampers, like those in Germany. But in the province of Holland there are wind-mills, with cutting and grinding engines, which do more in two hours than the others in twelve. In Saardam, a thousand persons are employed in Paper-making. Holland produces not one tenth of the quantity of rags used in that country for Paper-manufacturing, which are smuggled in from France, and imported from Germany, Italy, and Portugal; the latter of which are of the coarsest kind. The Dutch are chiefly jealous with respect to this manufacture, and the exportation of moulds is prohibited under pain of death. They export large quantities of Paper, principally dark purple, to Hamburgh. From 20 to 30,000 reams are annually exported to

Sweden; and the exportation to France, England, Denmark, and Russia, is not inconsiderable, because they manufacture some sorts superior to those manufactured in other countries.

I conclude by observing, that they chiefly manufacture writing-paper, and Paper of a dark purple colour, for packing sugar-loaves. For their own printing-presses, they purchase Paper from France and Germany.

We are obliged to Mr. Meerman's indefatigable perseverance for knowing that in 1308 linen Paper was used: the discovery of this invention may have been made some years sooner, but the precise period cannot be positively ascertained; nor in what country this invention originated.

In Italy is preserved linen Paper, of

1367,

1367, and in Spain, of the same year; in England, of 1342; in France, of 1314; and in Germany, of 1308; it is therefore likely, that Germany has the honour of its invention.

Ducarell states in his letter to Mr. Meerman, that, in England, many documents from the year 1282 to 1347 are preserved; but he acknowledges that it is impossible to ascertain, whether these manuscripts are written on Paper made from linen, without any mixture of cotton. Prideaux quotes a register of acts from John Cranden, of the 14th year of the reign of Queen Elizabeth, written on linen Paper in 1320; but it has been determined, that, in many instances, he had not a competent judgment to ascertain the true quality. Mr. Aftle, who wanted neither knowledge, nor the opportunity of making more effectual inquiries, is silent as to the time when the linen Paper came into use in England; all that he

remarks

remarks is merely a repetition of what Prideaux has stated. There is in the library at Canterbury, according to the Philosophical Transactions of the year 1703 (No. 288, page 515), an inventory written on linen Paper, specifying the inheritance of Henry, who was prior of Christ-Church, and died in 1340. Dr. Wendeborn states, that, in the British Museum, there are pieces of linen Paper from the Cottonian library, written in the reign of Edward III. in 1342; and he believes that if the manuscripts which it possesses were carefully examined, there might be found others of a more ancient date.

As nothing farther has yet been ascertained, or come to public knowledge, we must take these manuscripts of 1342 for the oldest proof of the period when linen Paper came into use in England.

The art of manufacturing Paper from
linen

linen and linen-rags was only established in England in the latter part of the 16th century. All Paper used before that time was imported from Holland and France, and she paid, so lately as the year 1663, 100,000*l.* to the latter country, for imported Paper. A German, of the name of *Spielman*, had the happiness, under the reign of Queen Elizabeth in 1588, to erect at Dartford, in Kent, the first Paper-mill; for which he received from her Majesty the honour of Knighthood.

It is recorded in the *Craftsman*, No. 910, that King William III. granted the Huguenots from France, refuged in England, (Biscoc and others,) a patent for establishing Paper-manufactories; and parliament granted to them other privileges: but, from a want of unrelaxed perseverance, œconomy, and industry, their undertaking met with the fate that often attends new establishments: it went to ruin, notwithstanding

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ing its success in the first few years; and the manufacture of Paper in general decayed, until the year 1713, when Thomas Watkin, a stationer in London, brought it in a short time into great repute and perfection; and it is a merit attributable to him, that the preservation of this important, most useful, and necessary of all arts has given rise to the establishment of the numerous Paper-mills that England now possesses, which manufacture very large quantities of Paper of all sorts in the greatest perfection: not only a great part of which is exported to foreign countries, but the importation of this commodity is now confined to a few assortments only, of which there cannot be a doubt, that these kinds of Paper yet imported, will soon be manufactured in this country of an equal quality, because, by perseverance, convenience in the construction of these manufactures, superior engines, presses and machines, and improved moulds, the industrious manu-

manufacturers have been assisted and enabled to give to English Paper its actual pre-eminence.

Ireland has, during many years, offered and paid premiums to encourage those concerned in Paper-making, for the manufacture of the best and the largest quantities of Paper; but notwithstanding such incitement, and that provisions and labour are there cheaper than in England, it is under the necessity of importing considerable quantities from hence, and paying a higher price than for their home-manufactured Paper.

Scotland manufactures good printing-paper, which greatly surpasses that of the Germans in whiteness and strength.—Messrs. Foulis, printers at Glasgow, are said to export annually on an average two millions of copies of books, and it must be presumed that they are partly indebted

debted to the superiority of the Scotch Paper, to that of Germany and the Northern countries, for the pre-eminence to which their printing-house has been raised.

England, which does not furnish such considerable quantities of rags as might have been expected from the number of its inhabitants, and their superior cleanliness in linen, notwithstanding, consumes at present, in its extensive and numerous Paper-mills, as many rags as any other country in Europe, Germany and France excepted. The revenue arising from the excise-duty on Paper amounted, in 1799, to 140,000*l.* If we now calculate that six-fifteenth parts of the whole quantity of Paper made in England is writing and printing Paper, which pays 2½*d.* per pound excise-duty;* that five-fifteenths

* Since the above was written, the duty on Paper has been doubled, and commenced in April 1801.

fifteenths are of the second class of Paper, paying 1*d.* per pound; and that, of the remaining four-fifteenth parts, one-half pays a halfpenny per pound, and the other half nothing; we find that 24,000,000 pounds weight of rags and other Paper-stuff is annually manufactured into Paper.*

One reason that may be assigned is, that they are not so carefully gathered as in other countries; but another and more powerful one is, that the greatest part of the English families are able to live more comfortably than the people of other countries, and think the saving of rags not worth their notice, or think them of so trifling a value, that a great part is burnt or destroyed. But, as I have before stated, that the British nation is in part indebted for their wealth, and pre-eminence above all other nations, to the manufacture of Paper, and the art of

* The importation of rags from the continent, in 1799, was 6,307,117 *lb.*

of printing, writing, and drawing; and as it is certain, that the quantity of Paper manufactured in England is the next to that of wool, cotton, and linen, and employs not only many thousands of hands in the mills, but gives bread to stationers, authors, printers, bookfellers, and bookbinders, which are so numerous with their dependents, that it may be taken for granted, that this manufacture gives livelihood to a greater number of persons than any other; every head of a family should therefore consider this branch of commerce and revenue as a national concern, and follow the example of the Dutch families, who lay by all old rags clean washed, and sell them assorted annually to the agents of the Paper-mills: and there can be no doubt but the saving of rags and waste Paper in England would equally contribute to the advantage of this valuable manufacture.

By the act of parliament, which prohibits,
under-

under a penalty, the burial of the dead in any other drefs than wool, may be faved about 250,000 pounds weight of linen annually*; which in other countries perish in the grave: but this is of little confequence relative to the great consumption of rags, and does not form more than one hundredth part.

The want of this article obliges us therefore to import the quantity required for our mills from abroad, until other fubftitutes can be converted to anfwer the purpofe of rags: till thofe are brought to perfection and generally adopted: and until the Paper manufactured thereof is univerfally protected, by every well-wifher to his country. The value of the Paper manufactured in 1784 in England has been ftated to amount to 800,000*l.* and it will not be over-rated

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* Calculating that out of thirty perfons living, on the average, one dies annually, and that one pound weight of linen might be ufed at every burial, and the number of inhabitants feven millions and a half.

if we give the present annual value, by reason of the increase of the use of Paper and of its price, at one million and a half sterling; which, after it has gone through the hands of the stationers, and is finished by the authors, artists, engravers, printers, and bookbinders, and put up for sale by the book and print-sellers and stationers receives such additional value, that its amount may be estimated at some millions more.

Parliament has therefore, for the support of this manufacture enacted, that rags, old nets, and ropes (which are used for manufacturing paste-boards, wrappers, and packing-paper), can be imported duty free; and last session, it likewise allowed the free importation of all waste-paper, provided it is torn into pieces so that it cannot be used otherwise than for being re-manufactured. These measures will in some degree assist the Manufacture recently established for that purpose; but notwithstanding cannot sufficiently

ciently obviate the lamentable scarcity, and greatly reduce the price of rags and other paper-stuff: the consumption of the Paper manufactured of the latter materials (old nets and ropes) has likewise increased very much, and must be the more considerable as the commerce of this country is extended.

These circumstances, and the establishment of the *Regenerating-Paper-Manufacture*,* brought to my recollection what Bruyset, Levier de Lisle, Fonde, Gleditch, Greaves, Guetard, Klaproth, Linnæus, Clarus Mayer, Reaumur, Schäffer, Seba, Stakel, Strange, and other scientific men had noticed, and their ideas on substitutes for paper-materials. These authors have stated, that as cotton, flax, and hemp, are the origin of paper

* The re-manufacturing of Paper has been long practised by the Chinese; and there is, in one of the suburbs of Pekin, a considerable Paper-manufacture for that purpose, which gives employ to numerous persons who collect waste-paper, which is purchased at a low price.

and rags, other vegetables of a tender and pliable nature might probably be converted into a mucilaginous pulp, and adopted as a substitute for rags in the manufacture of Paper; and farther, that those vegetables that are of a brittle and harsh nature, but which can be obtained in large quantities and at moderate prices, might by art and perseverance be made tender, without destroying that quality which is necessary to be retained in paper-stuff. It is a grand *desideratum*, that these suggestions should be brought into effect; and it is surprizing that the observations of the authors above quoted should not have been earlier attended to by scientific men, or rather by intelligent Paper-makers, who had the road thus opened to them for their investigation: for, should any man have discovered a commodity, which could be cheaply and plentifully supplied in this country, as a substitute for rags, &c. to mould unexceptionable Paper, such a man would amply merit the approbation and

encou-

encouragement of the public, notwithstanding *the jealousy* of those, who are acquainted with, and followed the hints of the above-mentioned authors, but failed in the same pursuit.*

Dr. Schäffer, it is true, worked with perseverance, industry, and ardour, to prove that numerous vegetables were qualified to make Paper, and his fame will be immortalized;

* Many hints have been given by others, and principally by an ingenious literary gentleman, long resident in India, to J. Sewell, of Cornhill, on the usefulness of many East-India plants, not only for making Paper, but likewise for the manufacture of linen cloth, sail cloth, and cordage; but they have not yet been attended to, notwithstanding Mr. Sewell has neither spared expense nor trouble to propagate these hints. Shall now a person who pursues such hints, and is by perseverance successful, in making useless articles valuable in manufactures and commerce, for the benefit of his country, not be entitled to merit, and the support of the publick, because the first idea has been communicated to him by others? Linen cloth has been manufactured from flax during several centuries, before the art of making fine lace of the same substance has been discovered: this improvement was nevertheless considered as a new invention.

lized ; but, notwithstanding that this author theorized on the subject with great ability, he accomplished nothing satisfactory by his experiments, which only tended to prove that various vegetables could probably be so mollified as to make useful Paper with the addition of a small quantity of rags : neither himself, nor any person who has followed him, has ever been able to make it at all without rags, or, even by mixture, fit for printing, writing, paper-hanging, and other purposes : it has only been fit for packing paper, and always brittle.

Travellers affirm that the Chinese and Japanese use a lye in their Paper-manufactories, by which they convert plants, the bark of trees, and several other vegetables, into a pulp,* which is afterwards moulded into a large and beautiful Paper : this Paper, however, notwithstanding its apparent smoothness,

* All Paper made in the province of Che-Kyang is manufactured from the straw of rice and other grain.

ness, is very liable to break. No author has satisfactorily described the ingredients that are used in making this lye, or the farther process that vegetables must undergo, before they are sufficiently macerated and reduced to a state to be formed into Paper: and all farther information has been cautiously concealed from us.

Nature, which is ever bountiful in supplying all our wants, has not only provided us with numerous materials for making Paper, but also shewn us in what manner vegetable substances may be formed into Paper, by the operation of Nature itself, of which G. A. Senger at Reck has given us knowledge in his *Most Ancient Record of the Fabrication of Paper, discovered in Nature*. It is the plant which has received the name of *conferva* from Linnæus and other naturalists who followed Pliny; which is to be found plentifully on the top of the water in brooks, rivulets, ponds, ditches, &c.

Men are little inclined to ascribe their knowledge to any other cause than to their own investigation, and most discoveries have therefore, by manifold and exquisite improvements, obtained, by our genius, the appearance which might lead us to consider all the perfections to which arts, sciences, and manufactures are arrived, as if they had been invented and brought into existence entirely by ourselves, without the aid of various accidental occurrences in the œconomy of Nature. All these discoveries nevertheless derive their origin from nothing else but the appearances in Nature, and men are consequently but the imitators of Nature, although in the most laudable sense.

This would require a more particular and more extended investigation than I am willing to deliver; and an expert philosopher would only be fit for such an undertaking, in order to suppress the prejudice and self-conceit of those who appropriate
their

their inventions alone to their own extended wisdom ; and to exhibit men in their feebleness, being entirely dependent on Nature.

Nature, which lays open to every eye, is the most excellent school of all for acquiring wisdom ; she forms the philosopher, and is the first channel by which the artist and chemist obtain knowledge and ability ; an astonishing light streams forth from the active stage of Nature into our organs, and her aim is to promote, step by step, decency and perfection in the moral world, if attended to, comprehended, and properly applied. It appears, therefore, strange to the strict observer of the phenomena of Nature, why so many of our arts have not been sooner discovered and brought into practice.

I do not look for these causes in the mysteries wherein Nature often cloaks her work, but rather in man himself, and in

his remissness, often occasioned by circumstances, and owing to the little attention he is accustomed to give to her phenomena.

Many of our learned men, in order to rectify and enlarge their ideas, confine their diligence and observations only to their books, neglecting to cast a penetrating eye on the secret and active operations of Nature; and a man of a searching spirit may be sometimes misled to aspire to supernatural things, and live and act in the speculations of an imaginary sphere, and leave, according to his imagination, the lower regions to idiots. Nature is the best teacher: the information obtained from books must be considered as secondary; and hints given to an active mind can only be brought to perfection by combining the instruction received from books with those which we obtain from Nature in greater perfection. To this we must join the inclinations which seem to be natural to us,
that

that we scarcely look for things of importance in our proximity, but are rather inclined to search for them at a distance. These are undeniable grounds why many hints for valuable discoveries have not been brought to perfection and practice.

Mr. Senger states that he became unexpectedly acquainted with the natural preparation and fabrication of Paper. He says:

“ In my walks on the borders of a small
 “ brook, I found both shores on the side
 “ of the hedges covered with a slimy
 “ substance, which the not long be-
 “ fore overflowed brook had deposited.
 “ The surface of the water was covered
 “ anew with a yellowish green vege-
 “ table, and in such places where the
 “ brook had bendings, lay considerable
 “ quantities of this fine vegetable produc-
 “ tion piled up in heaps, which gave addi-
 “ tional beauty to the blooming shores of
 “ the flowing brook. This appearance,
 “ and

“ and the thought of an useful application,
 “ attracted me into their interest, and de-
 “ termined me to examine it without de-
 “ lay, in order to discover its value, because
 “ I could not persuade myself that thrifty
 “ Nature could have brought forth so much
 “ beauty and such an astonishing great
 “ quantity of fleecy matter to no use or
 “ purpose.

“ This vicinity was for many days the
 “ place of my resort, and the little brook
 “ appeared to me to be a rich fountain,
 “ which concealed plenty of matter to in-
 “ crease knowledge, which might lead to
 “ some new discoveries, and in course of
 “ time recompense my endeavours with
 “ the most pleasing surprize.

“ This covering extended on the surface
 “ of the water, was not only a resting-
 “ place for insects of various sorts, and a
 “ well secured store-house for their broods,

but

“ but as Nature intends every where to
 “ give multiplicity of advantages, I ex-
 “ perienced very soon that it contained a
 “ proper stuff for making Paper, and what
 “ is more surprizing, a Paper prepared
 “ by Nature alone, without the assistance
 “ of imitating processes.

“ This peculiar web contains innume-
 “ rable fleecy parts of vegetation, which
 “ are generated, in the first part of the
 “ spring, on ponds and other standing wa-
 “ ters; they detach themselves from the
 “ bottom, and rise on the surface, where
 “ they appear as a handsome green and
 “ yellow covering. After these fleecy
 “ particles have remained for some
 “ time on the watery mirror; by the
 “ heat of the sun, and by the changing
 “ degrees of cold and warmth of the wa-
 “ ter, they become more united and felted
 “ together, bleached, and at last turned
 “ into a tough Paper-like covering. Or,
 if

“ if this fleecy substance is mixed together,
 “ and carried away by sudden inundations,
 “ occasioned by heavy rains, and deposited
 “ on the shores, it appears then like a thin
 “ jelly or slime, which, after it has under-
 “ gone several changes naturally produced
 “ by the contents of air and water, turns
 “ into a kind of Paper, which resembles
 “ the common Paper; or, where it has
 “ been produced upon clean water, it is
 “ not unlike a superior Paper, of which
 “ some may be gathered nearly as white
 “ as writing Paper.”

Must we not, with humble submission,
 still more revere the hand of the all-wise
 Creator in the works of Nature, when we
 find that she proceeds in this operation in
 the same manner as the Paper-maker in his
 mill, when he attempts to prepare Paper
 out of rags. This fleecy substance rises
 from the bottom of the water, and separates
 from its origin and vegetation, which is the
 first

first process; these materials are then prepared upon the surface of the water by the apparently invisible contents of all waters, which are in some more, in others less; by the softest of all waters, rain; by the refreshing air of the night; by the heat of the sun; and by glutinous and oily substances. The waves or motion of the water reduces it into the smallest particles, without destroying its texture, like a pulp made of rags when ground in the Paper-engine. The grassy shore receives at last this Paper-stuff manufactured by Nature alone, like the artist, who scoops in the Paper-mill the prepared materials upon frames, out of the vat, and deposits it upon hairy felts, in order to press and dry it. Mr. Senger is therefore entitled to the thanks of men, who too often overlook the most ingenious works of Nature, by giving them hints to fix their thoughts on this phenomenon, which represents to us so clearly the original fabrication of Paper, and hands down
to

to us the first and most ancient records thereof; in the ineffectual pursuit of which our ancestors have spent many centuries, and could never discover it to its full extent. It was left to the last year of the 18th century, to prove to the world that a strong Paper can be manufactured from all vegetable substances, on following those rays which Nature has laid open to our eyes.

It is natural to enquire how this phenomenon could remain so long hidden from the searching eye of men; or, if it was known, why did they not make use thereof; and learn from it, the useful art of making Paper? The more so, as this phenomenon extends itself over the whole surface of the globe; and as a thinking man, who possesses a speculating spirit, with a great mind not to relax his pursuits by disappointment, but to persevere in his undertakings, may be by it so easily led to the discovery of the artificial manufacture

ture of Paper, after so many hints have been thrown out by the before quoted authors. Have not many years expired since Dr. Schäffer produced a Paper mixed with rags, made from a kind of vegetable which he calls *water-wool*, and which was this *Conferva*?

This river Paper is completely fabricated by Nature, so as to be fit for writing or printing, if only taken from the surface of the water when ripe, (which is to be ascertained by taking a handful, squeezing the water out, and finding it fibrous,) hung up and dried, and smoothed with an iron.

It remains now to state which kind of *Conferva* is the most useful for making Paper, and may be plentifully obtained. Linnæus says that there are 21 sorts of *Conferva*, which I mean not to dispute, but to name those that are the fittest for the before-mentioned purpose, which are: *Conferva rivularis*; *Conferva bullosa*; *Conferva reticulatis*.

latis. These three can be gathered in abundance in summer and autumn, the time when ripe, purified, and united by the warmth of the sun, by means of oily substances formed likewise in the water by Nature. Mr. Senger says, that two children have gathered one thousand weight in one day.

I have heretofore stated the want felt by sociable men in the earliest ages, to discover means by which might be preserved to posterity useful and notable occurrences of time, the progress of arts and sciences, and in general to facilitate traffic amongst men. Tradition, which for a series of years was a substitute for writing, did but little in comparison to this art; many things of great importance were forgotten; many valuable sciences were lost, mutilated, or but confusedly handed down to posterity. After letters were invented, a beginning was made to give, as it were, speech

speech to rocks and metals, and to engrave on them memorable events. By degrees, art facilitated this gigantic mode, and taught to exchange this uncommon bulky manner of writing into an easier method, and to transcribe it on tables, which were superseded by metals, bones, and wood, until skins, barks, &c. were made use of. Centuries elapsed before a more convenient material to write upon was discovered ; and many unsuccessful experiments were made, and long years of labour were given up by the greatest men of science, before the discovery of the Egyptian *Papyrus*, and the art of making Paper from cotton and linen rags was invented.

The linen-rag Paper, which has so much improved and benefited mankind, was by degrees employed to other purposes than writing, and naturally very much encreased the price of rags, which makes the Paper so scarce, that sufficient quantities cannot be

obtained for the use of the numerous printing-offices, not only in England, but in all other enlightened countries; and accounts that have been received from various parts of the Continent shew that the price of rags will augment rather than abate. Considerations on these circumstances induced me to make further trials, and endeavour to accomplish that which had been thought impossible by others, and which had baffled the attempts of many ingenious men, notwithstanding the road had been opened to them by Nature, and the hints of men. My labours and perseverance have been crowned with success.

I have had the satisfaction to witness the establishment of an extensive Paper-manufactory, since the first of May 1800, at the Neckinger Mill, Bermondsey, where my invention of re-manufacturing Paper is carried on with great success, and where there are already more than 700
reams

reams weekly manufactured, of perfectly clean and white Paper, made without any addition of rags, from old waste, written and printed Paper; by which the Publick has already been benefited so far, that the price of Paper has not risen otherwise than by the additional duty thereupon, and the encreased price of labour. And it will not be many weeks before double that quantity will be manufactured at the said mill.

Thus far succeeding, my other more extended views, in assiduously endeavouring to manufacture the most perfect Paper from straw, wood, and other vegetables, have been likewise successful. And I am able to produce to the publick very strong and fine Paper, made thereof, without any addition of other known Paper-stuff, notwithstanding I have not yet had the advantage of making it in a mill, regularly built for such a new undertaking. The Paper where-
upon

upon this is printed is an undeniable proof.* It is however only of an inferior quality, being made from the straw in the state it comes from the farm yard, without assorting the weeds, and those parts of the straw which have been coloured by the weather. I have used this kind of Paper on purpose to demonstrate the progress of so singular an undertaking, and to prove its possibility to the world, notwithstanding the opinion of many scientific men, particularly that of the ingenious Breitkopf at Leipzig, that Paper made from straw cannot be used for printing. This specimen, and others of a much finer quality which have been manufactured, leave no doubt, that, when the manufactory has been regularly established with the necessary implements, I shall make straw Paper in as great perfection as any made from rags; and by several trials which I have made to change the yellow colour into cream colour, and white, it seems to be

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* Part of this edition is printed on Straw Paper.

unquestionably practicable, which will extend its consumption, and remove the prejudices which are generally cherished against new discoveries; notwithstanding its natural colour is not only pleasing, but grateful to the eye for writing and printing, principally for musick-notes by candle-light. Copper-plate printers assert that it takes the impresson superior to French copper-plate paper, and it has a beautiful effect in landscapes and pictures, for drawing, and paper-hangings.

In my former edition I said, (p. 79) “ I flatter myself that my exertions will meet with the approbation and support of the community at large.” Since which my expectations have been gratified, not only by the sanction of the legislature, who have been pleased to pass an act of parliament, by which my undertaking has been greatly facilitated, so that I am now able to establish this manufacture to a considerable extent,

extent, but also, by the approbation and support of persons of the first respectability, who have come forward to patronize it; which is the strongest test the publick can require of its general utility, and national importance; the last of which is certainly of much greater extension than by many is conceived; because, by the establishment of a large manufacture of this kind, numerous hands of both sexes, and of all ages, will be employed and gain their livelihood, who now are, or otherwise might become, a burthen to the parishes in which they reside; it will increase the revenue; it will prevent the necessity of sending large sums of money out of this kingdom, for the purchasing of rags;* it will render several of
the

* If from 5,000 to 6,000 loads of straw will be converted annually into Paper, used for Paper-hangings, it will be equal to the quantity of rags imported from the continent in 1799. A great part of those rags are used for that kind of Paper (elephant,) that being of a stronger texture than English rags. And as Paper-hangings made
from

the commodities to be employed in this manufacture more valuable and useful than they have hitherto been, (many of which have been thrown away) which of course is interesting to the landed property of this country, as the value of land must naturally encrease; and it will ultimately reduce the price of Paper.

But whether or not this country can avail itself of all the advantages that are likely to result from a discovery which promises to become so generally useful, must, in my humble opinion, intirely depend on those measures, which the legislature of this country shall in their wisdom think it prudent to adopt, in order to prevent the discovery from

from straw Paper may be manufactured much cheaper to the taste of the people abroad, than they can make it from rags, this country will be enabled to provide the whole world with it, *at a lower rate than it is possible to be manufactured from rags*, and foreigners will be necessitated to send their money to this country for the purchase of it.

from being known to other countries:—a measure not undeserving the attention of the British government, at this conjuncture, when the splendor of its manufactures and commerce is more envied than at any former period of our history.

By the sanction with which the legislature has favoured my discovery; by the support of men of fortune and respectability who have come forward to facilitate my endeavours to establish this manufacture on such a scale as to make it of importance to the publick; and by the approbation with which it has been honoured by numerous persons; I flatter myself to overcome all prejudices against this new invented wood, straw, and vegetable Paper, and that I shall, by my unremitting perseverance, bring the discovery to the greatest perfection, and that my efforts will render it eligible for general use: then the opinions and judgments, which are inconsiderately or enviously circulated to the

injury

injury of many new inventions and establishments, will be turned to its advantage, and promote its prosperity, which are the most effectual means, not only to prevent a further rise of the price of Paper, but contribute to its reduction.

It will be productive of the greatest satisfaction, if, by farther researches, I can accomplish the object I have in view, namely, that of manufacturing Paper from vegetables, for the purpose of making bank-notes, which by the experiments I have made I am convinced I shall be able to effect. A discovery of such description must be a source of great and pleasant reflection to every philanthropic mind, since the opportunities of forgery on the Bank of England, which at present exist, will be most effectually done away, and the publick mind relieved from hearing of such crimes, and of the executions which ensue from the conviction of the offenders. That such will be the

the good consequences resulting to the community, from manufacturing Paper of the said materials for the before-mentioned purpose, must be manifest, because the mixture of vegetables from which the Paper would be made might remain a secret, if the necessary measures for that purpose are adopted: consequently no forgery could henceforth be committed on the Bank, as long as such Paper should be used in making bank-notes, because the counterfeiting of the Paper cannot take place, as long as the materials from which it is made is unknown, and as long as the Patent granted by *His Majesty* is in force.

APPENDIX.

A P P E N D I X.

AS an Appendix to this little Tract, I think it proper to submit a few more remarks on the National Importance of discovering materials which can be converted into Paper, and grow sufficiently abundant in Great Britain, without the necessity of importing them from foreign countries.

The following lines are printed upon Paper made from Wood alone, the produce of this country, without any intermixture of rags, waste paper, bark, straw, or any other vegetable substance,

from which Paper might be, or has hitherto been manufactured; and of this the most ample testimony can be given, if necessary.

Having thus far succeeded in my researches, to make an useful Paper from one kind of Wood, I doubt not, but, that I shall find many others equally eligible for the same purpose, of which I trust it will be in my power, within a few weeks, to give indisputable proof that my expectations have been well founded, and that I have not cherished a visionary opinion.

History furnishes us with numerous examples of one discovery giving birth to others, and, if my success of having encreased the quantity of Paper materials, by rendering these applicable to that which have never been before applied to such a purpose, should

should incite active and industrious artists, to make farther improvements in their various manufactures, my feelings will be amply gratified. Various hints may be suggested to those who are already acquainted with the properties of Paper, when pasted in lamina on each other; it may, by this means, be made to form a substance, as durable and more impenetrable than oak.

Having long admired the celebrated manufacture of Mr. *Clay*, at Birmingham, who has demonstrated to what perfection and beauty it has been brought, it will, in the course of time, perhaps not be surprising to find, that objects of greater consequence will engage their attention in the same pursuit, and prove, that the properties from successive layers of Paper, may be found a substitute for many purposes,

for which at present foreign Wood is required.

One of the greatest obstacles to the improvement and extension of this art has been probably the scarcity of the raw materials. Now that these are found *at home* in sufficient abundance, means may be found to supply manufactures with any quantity required, at reduced prices.

It may probably be ultimately proved, that Paper thus prepared, will be a lighter, neater, and more durable covering for buildings of all kinds, and it is equally true, that the ingredients, with which the cement can be composed, will render this substance not only incombustible, but more durable than slates, tiles, (which in the course of time become brittle) and wood in
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its natural state, and incorruptible by insects. Who can say that coach-makers, chair-makers, and cabinet-makers, will not make use of it for carriages, chairs, and elegant household furniture, and reflect that a substance possessing such superior properties ought to be preferred; having flexibility, hardness, and capability of being worked with infinite greater neatness and lustre than wood, which is so much affected by the air and weather. Converting wood, straw, and other vegetable substances into Paper, may therefore be rendered useful for a variety of purposes; and the substance of the Wood Paper on which these lines are printed, (which is the first attempt to make it in a quantity) exhibits an indisputable proof, that useful Paper may be manufactured from the hardest part of wood alone, destitute of its pith or bark; and, if
any

any of the suggestions here stated, as to the application of the manufactured material should be thought reasonable, experiments of some able manufacturers will prove, that this Paper can be again converted into a substance, more hard and durable than any wood of natural growth.

Considering, in its full extent, the numerous uses to which the discovery of making Paper from wood, straw and other vegetables, which always can be obtained in this country at moderate prices, can be applied, it is certainly an invention that merits attention and support. If only fit for the manufacture of inferior sorts of Paper, and Paper-hangings, this country will be enabled to cope with the whole world in this species of commerce, on the most advantageous terms, and to enrich

enrich herself, by opening this new source of trade, very lucrative to the revenue, and allowing the manufactured commodity to be sold for less than the present price of Paper; whilst, at the same time, it will make several materials* more valuable, and, by giving employment to thousands of women and children, thereby establish an influx of real wealth into this country.

The wisdom of the legislature has rendered it necessary that the specification of every patent should be made public within the space of twenty-eight days, which has been sometimes extended to six months. The patentee's benefit exists for fourteen years, and is extremely well protected by the law against the infringement of its privileges, by the inhabitants of Great Britain; but it appears very extraordinary, that
every

* Saw-dust, wood-shavings, old mattings, &c.

every patent is open for the inspection of foreigners, and that the patentee remains unprotected with respect to them. A pamphlet has been suffered to be published monthly, since the year 1794, which describes not only the existing patents of the country, but contains complete drawings and descriptions of new-invented machines. This pamphlet has been, and will be, immediately translated into the continental languages; a practice which has, no doubt, proved highly detrimental to the revenue and commercial interest of this country.

If a patent is obtained for an ingenious invention, which may have cost the author many years intense labour and study, and the result produces great national wealth by the manufacture and exportation of the commodity, the prospects may be clouded in
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an hour, and all expectation baffled by foreigners reading the specification; who, by erecting similar manufactures abroad, under greater advantages,* deprive the country of the revenue and commerce. If this subject was duly weighed, it surely might be remedied. It may be asked, why a patent is to be openly exemplified before its term is expired? for, as it can be of no use to the inhabitants of this country, during the space of fourteen years, for what purpose is it exposed? and why are foreigners permitted to reap the benefits to which this country is only entitled? It is undeniable, that it operates as a perpetual discouragement to the future efforts of genius, preventing monied men from carrying the most valuable dis-

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coveries

* They do not want to spend money to bring the invention to perfection; and manual labour, building, and rent is cheaper on the Continent.

coveries into effect. The doubtfulness of success alone sufficiently damps the ardour, perseverance, and exertions necessarily required in the pursuit of skilful and laborious inquiries; but, having succeeded to his utmost wishes and after having incurred very injurious expenses in the prosecution of his design, he is foiled in all his hopes of compensation, by the exposure of the means through which the discovery has been effected. This consideration alone ought to weigh with those by whom this evil can be remedied to the individual. But, much as it may be lamented, this injury bears no proportion to the losses which the revenue and commerce suffer,

It therefore appears impolitic in the last degree to expose the exemplification of a patent to public disclosure, and to be a *desideratum* of such infinite

finite importance, that the Legislature may think of some method to prevent the art from being divulged in a patent, and being purloined by foreigners, who are jealous of the greatness of the manufactures, commerce, and navigation, of Great Britain.

The importance of this is sufficiently obvious by daily experience; and it seems very astonishing that the Legislature has not before taken it up as a general measure; as it is not only a great hardship, but an act of injustice, that the people of this country should be restrained from the use of inventions, for which patents have been granted, for a term of fourteen years, which foreigners can immediately avail themselves of abroad, by procuring copies of the specifications inrolled here, which it is notorious they are in the daily habit of doing, and which stands proved in the Report of

last Sessions of Parliament by the Committee, to be considered by them as a matter of great importance, from their remitting money to Bankers in this kingdom to pay persons for collecting and sending over particulars of our Discoveries and Manufactures. One cannot help observing the impolicy of that legislative act, which declares it a crime for any subject or other person in this realm to send abroad any machine or other apparatus used in our manufactures: yet permits written and printed copies of the particulars of inventions, and prints of machinery, to be daily transmitted abroad: nay, suffers a work monthly to be published in this metropolis, avowing itself to be a description of inventions and discoveries, and the mode in which they are effected, together with the plates of all the machinery, which publication is translated abroad in different languages. Is it to be contended that a

skilful

skilful mechanic cannot make a machine from a drawing and complete description of machinery, but only from the actual machine itself? The only objection that seems to oppose itself to this measure is, that it would be a hardship to punish a man for an infringement of an invention, the mode of carrying on which, he has not an opportunity of inspecting before committing the act, and therefore could not intentionally have infringed, but of which he would have had the previous inspection, if the specification was inrolled as directed. The answer to which is, that particular and private inconvenience ought to give way to general good; but here, (by my patent) that sacrifice is not required to be made, and I think there will not any real inconvenience be sustained by this measure being generally adopted for all patents which may be granted.

My

My patent being for making Paper from Straw, &c. during the term of fourteen years; no person has any right during that period to make it from such raw materials as are described in my patent; and I have proved to the Committee of both Houses of Parliament by satisfactory evidence, that the perfect Paper exhibited there was made solely from the substances mentioned in the patent: but, supposing a person to have discovered a new mode of making Paper from Straw, much more useful and beneficial than the present, and that it was necessary he should see the exemplification of mine, to shew that his is original, and not an infringement on my invention, he has only to apply to the Lord High-Chancellor, whom I humbly submit should have the control over the keepers of my exemplification, and on verifying the facts, he would immediately direct an inspection. I trust the

Legislature

Legislature will not esteem unworthy of their notice my observation for the benefit of the country, revenue and commerce,

FINIS.

